The RUBBER AGE

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LATE NEWS of the Industry

Dayton Considers Tire Price Advance, But Trade Deems General Rise Unlikely

THE Dayton Rubber Manufacturing Company, Dayton, O., will increase prices on all types of tires in the near future, John A. MacMillan, president, stated at the end of last month. Prices will be advanced between 3 per cent and 20 per cent on all sizes of casings, he said.

"For some time," Mr. MacMillan commented, "tires have been sold at ridiculously low prices bordering, in some instances, on cost of production, and an increase may be expected any day."

Mail order house officials immediately denied that their own prices would be advanced in any way. Executives of Sears, Roebuck & Company and Montgomery Ward & Company said that they contemplate no changes at all in automobile tire prices, according to newspaper reports.

Authorities in the trade find that officials of the various major rubber companies are not particularly impressed with the possibility of an increase in tire prices within the near future. While some of the smaller companies may be fairly enthusiastic about taking such a step, observers of the industry point out that it would be illogical to believe that much can be done without the leadership of the larger firms.

Several factors are pointed out by trade authorities to militate against a change in prices either way at this time. While in the past tire companies have been forced to change their price schedules during the year, they prefer to do so only at the end of the sales season which falls in November. At the same time since renewal sales have increased so satisfactorily during the present quarter, sales executives are not anxious to disturb the situation especially with the prospects of even better public buying of tires coming in during the summer months.

Automotive Parts and Accessory Trade Held Up Strongly During Month of May

MAY shipments of automotive parts, accessories and service equipment held their own against April to compare favorably with figures for 1930 when there was a decided dropping off between May and April, according to reports received by the Motor and Equipment Association from member manufacturers, including several in the rubber industry.

The grand index for all groups of manufacturer members reporting stood at 124 per cent of the January, 1925, base figure of 100 to remain unchanged from the April figure which also stood at 124. May is the first month this year which has not shown an increase over the preceding month. Last year, however, May dropped to 144 from an April figure of 163, a decline of 19 points.

May shipments of parts and accessories to car manufacturers for original equipment showed a slight increase over April. This is the sixth consecutive month to show an increase over the preceding month in this classification.

Goodyear Continues Common Dividend; Finds Renewal Sales Above Last Year

RENEWAL sales of tires during the past three months have been from 10 to 15 per cent ahead of the same period last year, P. W. Litchfield, president of the Goodyear Tire & Rubber Company, stated late last month following a session of the company's board of directors. Original equipment sales, however, have shown a decline in line with the lower rate of activity in automobile manufacturing, he pointed out.

"The renewal sales will continue in good volume," Mr. Litchfield predicted, "with results for the year showing an increase over 1930, which will be offset partially by a decline in original equipment business."

The directors voted a quarterly dividend of 75 cents a share on the common stock, payable August 1 to stock of record July 3. This is at the rate of $3 a year, which was adopted with the May 1 payment. From August 1, 1929, to February 1, 1931, the stock had been on a $5 annual basis.

One change was made in the board of directors, George T. Bishop, president of Continental Shares, Inc., succeeding W. R. Burwell. Mr. Burwell until a few months ago was president of Continental, huge investment trust with heavy holdings in Goodyear. Mr. Bishop became president and Mr. Burwell vice-president at the time Cyrus S. Eaton resigned as director and chairman of the board to permit the leading Cleveland banks to assume control.

Mr. Bishop succeeds Mr. Burwell on the Goodyear executive and finance committee as well as on the board of

directors. Other members of this committee are E. B. Greene, P. W. Litchfield, G. M.-P. Murphy, J. R. Nutt, Francis Seiberling and G. A. Tomlinson. In addition to Mr. Bishop, Continental Shares, Inc., is represented directly on the Goodyear board of 17 directors by J. Arthur House, a director of Continental, as well as president of the Guardian Trust Company, Cleveland. Cyrus Eaton associates remaining on the Goodyear board include T. M. Girdler, James T. Begg and G. A. Martin.

Mr. Bishop has had a business experience of more than 40 years with railroads, public utilities and manufacturing companies. He is a former chairman of the Niagara, Lockport & Ontario Power Company and of the United Gas & Electric Company and a former president of the Frontier Corporation. He is also a director of the Seiberling Rubber Company.

Rubber Abrasion Testing Symposium is Feature of A. S. T. M. Annual Meeting

MEMBERS of the American Society for Testing Materials held one of their most interesting annual meetings at the Stevens Hotel, Chicago, Ill., from June 22 to 26. An exhibit of testing apparatus and machines was a new feature of the session, while the rubber technologists in attendance found special interest in a symposium on the abrasion testing of rubber.

K. B. Cook, acting chairman of Committee D-13 on Textile Materials reported new specifications and test methods for enameling duck for the tire industry and revisions in specifications for chafer fabrics. The committee members voted to hold their next meeting at Washington, D. C., on October 15 and 16. Although more than 1,000 A. S. T. M. members attended the Chicago convention, only about 20 Committee D-13 members were present, the point being made that the October and March meetings in the East, which are of greater significance, bring out more members.

At the meeting of Committee D-11 on Rubber Products, progress was reported on subcommittee activities and the organization of a new subcommittee on dynamic fatigue testing was announced. W. L. Sturtevant was appointed chairman of this new subcommittee, which will study this field of testing for rubber products as applied particularly to repeated extension, bending and similar tests. New tentative specifications for rubber pump valves were presented to supersede the standard specifications, and the advancement to standard of tentative specifications for rubber insulating tape was recommended. Revisions were offered in specifications for insulated wire and cable, for steam hose, in methods of chemical analysis and in the standard methods of testing rubber products.

The abrasion testing symposium included five papers (*abstracts in* THE RUBBER AGE, *June* 10, 1931, *Page* 215) and was followed by an open discussion of the subject by the members present. Another interesting paper was presented during the sessions by R. L. Templin and R. G. Sturm, of the Aluminum Company of America, on "Methods for Determining the Physical Properties of Rubber Compounds" (*abstract in* THE RUBBER AGE, *May* 25, 1931, *Page* 166).

The exhibit of testing apparatus and machines at the Stevens Hotel was the first to be held by the society and was the first large-scale instrument show ever conducted in this country. Among the commercial exhibits were those of the Baldwin Southwark Corporation, universal testing machine and other apparatus; Christian Becker, Inc., balances and weights; Brown Instrument Company, pyrometers and flow meters; Riehle Bros. Testing Machine Company, hydraulic universal testing machine; Shore Instrument Company, durometer and elastometer; C. J. Tagliabue Manufacturing Company, hydrometers, thermometers, colorimeters, viscosimeters and other equipment; Testing Machines, Inc., associated with H. Z. Schniewind Foreign Paper Mills, Inc., tensile strength testers, bending testers and hardness testers. Among the educational exhibits the Bell Telephone Laboratories showed a pressure indicating micrometer, which meaures the thickness of resilient or compressive sheet insulating materials such as rubber under conditions of constant pressure. A compressibility machine for insulating materials was also exhibited by this organization.

Rubber Section, National Safety Council, To Have Interesting Program in October

THE executive committee of the Rubber Section of the National Safety Council met in the offices of the Detroit plant of the United States Rubber Company.

The work of the committee was devoted largely to completing the year's activities. Considerable time was given to the final plans and program for the meeting of the Section during the 20th Annual Safety Congress which will be held in Chicago from October 12th to 16th. General Chairman C. L. Hungerford of the Firestone Tire & Rubber Company said, "I believe the Rubber Section program for the 1931 meeting will prove to be one of the most interesting the Section has ever held. No effort has been spared in developing the plans for our meeting and we feel sure that executives, accident and fire prevention men in the rubber industry will be vitally interested in our discussions."

Those in attendance at the meeting were: C. L. Hungerford, Firestone Tire & Rubber Company, Akron, O.; J. R. Hanson, United States Rubber Company, Passaic, N. J.; R. A. Bullock, Corduroy Tire Company, Grand Rapids, Mich.; Roland Kastell, United States Rubber Company, Passaic, N. J.; H. W. Low, The Miller Rubber Company, Akron, O.; M. A. Quirk, United States Rubber Company, Detroit, Mich.; B. Gerphide, Goodyear Tire & Rubber Company, Akron, O.; R. H. Ferguson, National Safety Council, Chicago, Ill.

The tentative program for the fall meeting includes papers on fire protection in the rubber industry and ventilation for solvents and an address by Dr. J. Newton Shirley, of the Hood Rubber Company, Watertown, Mass. In addition to the longer papers, there will be a series of five-minutes talks on subjects of particular interest to rubber factory men. Among these subjects and speakers will be "Organizing and Maintaining Interest in a Safety Committee," M. A. Quirk, United States Rubber Company; "How We Can Interest the New Employe in Safety Work," C. L. Hungerford, Firestone Tire & Rubber Company; "Safeguarding Health of Compound Room Employes," P. B. Martens, Industrial Commission of Ohio; "Inspection of Rubber Machinery and Equipment," W. L. Schneider, B. F. Goodrich Company; and "Basic Causes of Accidents and Their Value," E. W. Beck, United States Rubber Company.

India Again Jumps Tire Output

The India Tire & Rubber Company has made a further increase in its rate of output to 2,700 tires a day, scheduled for the 26 working days in July. This will mean that the factory at Mogadore, O., will turn out 70,200 tires in July. The company's unit sales were 131,031 in the four months ended April 30, as against 67,757 in the same period of 1930.

(Other news of the industry will be found on Pages 321-327)

Some Properties of Carbon Black†

III—Volatile Matter‡

By W. B. WIEGAND AND J. W. SNYDER
Binney and Smith Company

THE method used, which is essentially that of the American Society for Testing Materials (No. D-271-30) is as follows:

A 15 cc. capacity, bright, well-burnished platinum crucible is used. It is equipped with a close fitting capsule cover. The tared crucible is filled as nearly as possible without danger of overflowing when the lid is put on.*

The lid is then carefully seated and the crucible and contents weighed up. Crucible and contents are then heated in a specially designed electric furnace of the vertical type** for exactly 7 minutes at 950° C. plus or minus 20° C. Temperature is determined by a thermo-couple placed just below the crucible in the furnace and can readily be maintained constant to within this value by means of a rheostat.

The crucible is then removed, cooled in a desiccator and weighed up. The value for total volatile thus obtained is corrected for moisture, determined by heating one hour at 105° C., and the results reported as the true volatile matter on the dry basis. It must be understood that volatile matter determined as above does not represent the loss of any fixed components in the carbon black. For example, if the heating for 7 minutes is carried out at temperatures lower or higher than the value mentioned the volatile loss also changes[2]. Similarly the volatile loss is a function of the time of heating[3].

The selection of 7 minutes as the time of heating is justified by the circumstance that the rate of loss of weight diminishes sharply at about this period.

Influence of Air in Crucible

Three different rubber carbon blacks were volatile-tested in the usual manner, that is, cooled in a desiccator and weighed up with the lid undisturbed. They were then put back into the same furnace and given a second standard heating. The results are shown in Table I.

TABLE I

Rubber Carbon Black
Second Volatile

Sample	*First Volatile*	*Second Volatile*
A	7.0%	0.4%
B	5.1%	0.3%
C	5.3%	0.4%

The volatile loss on second heating was less than 10 per cent of the original value. On the assumption that this second volatile loss is due to combustion caused by air present in the crucible a rough calculation was made which indicated a possible combustion loss of 0.3 per cent. The close agreement with the experimental value makes plausible this explanation of the secondary volatile loss.

It may here be pointed out that if the volatile loss determined in vacuo is less than that determined at atmospheric pressure because of the absence of air in the crucible, such decrease should not exceed .3 per cent as shown in Table I. Johnson, however, noted a difference of well over 1 per cent. This point will be referred to again.

The combustion factor is clearly important, also strict uniformity in the details of the test. For example, one test in our laboratories carried out with the lid fitting loosely instead of tightly showed volatile matter losses in the neighborhood of double the true value.

Effect of Charge of Black

The more nearly the crucible is filled with carbon black the less the amount of air originally contained (or entrained) within it; likewise, of course, the smaller the relative loss due to combustion. Of these factors the second is probably the more important. The effect due to such change in the charge of black within a crucible of given size is shown in Table II.

TABLE II

Standard Volatile Test
Effect of Charge of Black in 30cc. Platinum Crucible

Wt. "Rubber" Carbon Black	*Volatile*
3.6478 grams	6.0%
2.4150 grams	6.4%
1.9366 grams	6.7%
1.2996 grams	7.3%
.6479 grams	8.7%

Summing up, meticulous care in the fit of the lid, charge of black, control of temperature and of time of heating are essential for consistent results in the volatile testing of carbon black.

Volatile Matter in Different Types of Carbon Black

The statement[4] has been made that the amount of volatile matter in different blacks varies according to the temperature at which the black was made, the implication being that the higher the temperature of formation the smaller the amount of volatile matter. The examples quoted by Carson and Sebrell in this work and which include black made under widely different conditions, by thermal decomposition, etc., do, it is true, lend some support to this point of view. There are, however, important exceptions to this rule even in the class of blacks not collected by impingement. For example, various grades of lampblack show a range of volatile matter of from less than 3 per cent to over 17 per cent[5]. These differences cannot be correlated with corresponding differences in temperature of formation.

When it comes to impingement or true carbon black the rule would seem quite inapplicable. In this connection a series of data from this laboratory are shown in Table III.

*If more than this amount is used, that is to say if there is an overflow of black at the time when the capsule lid is pushed home, there is a tendency for black to accumulate in the small vent in the cover. Such a condition involves the likelihood of puffing as the volatile is driven off.

**This furnace is usually sold as the Hoskins-Fieldner type electric furnace.

†Paper presented at *Congres des Techniciens du Caoutchouc*, Paris, June 13, 1931.

‡This paper is part III of a series on "Some Properties of Carbon Black." Part I on *Adsorption* was published in J. I. E. C. June, 1931. Part II on *Moisture* will be presented shortly.

TABLE III

Type of Carbon Black	*Temperature of Formation*	*Volatile Matter*
Standard Rubber Black	Moderate	4.5%
Color Black	Very high	5.7%
Special Rubber Black	High	6.5%
Ink Black	Moderate	13.5%

It is seen that blacks made at moderate temperatures may show very low and very high volatile matters. Also a color black made at very high temperatures may show a volatile higher than that for standard rubber black made at a lower temperature.

Three further questions suggest themselves as of interest: what is the nature of the volatile matter, what its significance, and to what extent, if any, can it be controlled?

The Composition of the Volatile Matter in Carbon Black

Volatile Matter from Standard Rubber Carbon Black at Atmospheric Pressure

The following data are taken from C. R. Johnson[3].

TABLE IV

Analysis of Gas Evolved During the Volatile Test

	% by Volume	*% by Weight*	*% by Weight on Original Carbon*
Carbon Dioxide	15.17	26.8	1.20
Illuminants	0.16	0.5	0.02
Oxygen	0.91	1.2	0.05
Hydrogen	23.27	2.0	0.09
Carbon Monoxide	53.25	61.8	2.78
Ethane	.....	.....	.....
Methane	1.545	1.1	0.05
Nitrogen	5.70	6.6	0.30
	100.00	100.00	4.49

It will be seen that on a volume basis the gases evolved comprise carbon monoxide, hydrogen and carbon dioxide in decreasing order. These three gases account for over 90 per cent, by volume, of the total. Calculated back to percentages by weight the figures look quite different. Thus the hydrogen which, by volume, accounts for about one-quarter of the gases evolved amounts really to but 2 per cent by weight of the total.*

Volatile Matter at Low Pressures

In the same paper Johnson reported that when carried out at low pressures (17 mm. mercury and less) the volatile matter showed substantially lower values, the difference amounting to as much as 1.4 per cent. He explains this (loc. cit. P. 907, also Ref. 6, P. 1288) as follows:— "That the oxygen was removed at low pressure without combining with the carbon, thus making a lower volatile loss."

The analytical data offered in support of this explanation do not seem quite to warrant this conclusion, the importance of which is evident in any study of the structure of carbon black.

The data in question have therefore been rearranged in Table V.

TABLE V

Composition of Volatile Matter

From Johnson[3], and referred to Percentage by Weight on Original Sample of Carbon Black

	Low Pressure	*Atmospheric Pressure*
Carbon Dioxide	0.50%	1.20%
Illuminants	0.04%	0.02%
Oxygen	0.07%	0.05%
Hydrogen	0.12%	0.09%
Carbon Monoxide	2.06%	2.78%
Methane	0.02%	0.05%
Nitrogen	0.30%	0.30%
Totals	3.11%	4.49%
Total Carbon	1.07%	1.58%
Total Hydrogen	0.13%	0.09%
Total Oxygen	1.61%	2.52%

*The carbon accounted for in Johnson's analysis of volatile matter falls short of the carbon loss taken from his combustion analyses before and after volatile heating by the following figures (loc. cit.): Sample A, 0.7%; Sample B, 1.2%; Sample C, 1.3%; Sample D, 0.8%; Sample E, 1.8%.

A study of the above data shows that the actual increase in elemental oxygen (0.02%) is totally insufficient to account for the decrease in carbon monoxide and carbon dioxide (1.42%). The total oxygen recovered under low pressure came out at 0.9 per cent *less* than under atmospheric pressure. This would seem to leave but two alternatives, either the oxygen escaped as water (which was not determined) or remained attached to the carbon.

The former possibility would appear to be ruled out because in such an event the water liberated would have to be 2.5 out of the 3.11 per cent volatile loss (in vacuo). The second alternative, viz., that heating to 950° C. under vacuum left 0.9 per cent more oxygen attached to the carbon than heating to the same temperature under atmospheric pressure would seem highly improbable.

Volatile Matter as Determined by Analysis of Carbon Black Before and After Heating

In Table VI are shown data from this laboratory representing elementary analyses on three typical grades of carbon black before and after being given the standard volatile matter treatment (v.s.). Traces of sulphur and small percentages of nitrogen present in these blacks are not included in these data. Since the oxygen values are obtained by difference they are in error to this extent which, however, is not in general greater than 0.1 per cent (as oxygen)).

TABLE VI

	Analysis Before Volatile			Analysis After Volatile		
	% Carbon	*% Hydrogen*	*% Oxygen*	*% Carbon*	*% Hydrogen*	*% Oxygen*
Rubber Black	96.4	0.6	3.0	99.0	0.3	0.7
Color Black	95.9	0.4	3.7	98.2	0.3	1.5
Ink Black	92.6	0.2	7.2	98.0	0.5	1.5

This shows the residue as being higher in carbon, lower in oxygen and with hydrogen substantially unchanged. However, for the present purpose a clearer idea of what goes on during volatile heating can be had if the analyses are referred to the original weight of the carbon black as in Table VII.

TABLE VII

	Before Volatile Test			After Volatile Test		
	% Carbon	*% Hydrogen*	*% Oxygen*	*% Carbon*	*% Hydrogen*	*% Oxygen*
Rubber Black	96.4	0.6	3.0	94.5	0.3	0.7
Color Black	95.9	0.4	3.7	92.5	0.3	1.4
Ink Black	92.6	0.2	7.2	84.8	0.4	1.3

This table brings out more clearly exactly what happens to carbon black when volatile matter is expelled,—oxygen is eliminated, and along with it, carbon. It has been seen above that oxygen is present as such in the volatile matter only in very small percentages. The conclusion is that the bulk of its oxygen can be removed from carbon black only in the form of carbon monoxide and carbon dioxide.

For this there appear to be only two possible explanations: either the oxygen as such burns the carbon prior to being expelled, or it is present in the form of a complex or compound which on heating breaks down into the oxides of carbon.

Unfortunately complete data regarding the carbon-oxygen equilibria at various temperatures and pressures are not available for carbon black as they are in the case of charcoal as described by Rhead, and Wheeler, etc., [7, 8, 9, 10, 11].

About all that can be said under the circumstances is that there appear to be few* properties of carbon black which are not in harmony with the CxOy hypothesis advanced by Rhead and Wheeler for the case of charcoal.

A rough calculation, assuming the diameter of the carbon black particle to be 50 $m\mu$ and the oxygen to be present in a mono-molecular layer on the surface of each particle, gives a value for oxygen content of 3 per cent by weight, which is of the proper order. See also Parkinson[12].

THE SIGNIFICANCE OF VOLATILE MATTER

Volatile Matter and Adsorptive Activity

In the first paper of this series[1] a brief reference was made to the altered behavior of deactivated or heat treated carbon black in regard to adsorptive activity towards D.P.G., on the alkaline side, and towards hydrochloric acid solution, on the acid side. In this case the alkaline adsorption was approximately halved and the acid

*For one of these see Page 314.

adsorption definitely increased. The effect of the heat treatment was stated to be an alteration in the character of the surface acting in such a way as to correct the asymmetry of the adsorption as between basic and acidic substances. The significance of volatile matter in relation to these adsorption characteristics will now be briefly discussed.

Change in Volatile Matter in Heat Deactivated Black

The black referred to above was standard rubber carbon black*. The volatile matter before heat deactivation was 5.0 per cent. After treatment the value was 1.5 per cent. The corresponding content of oxygen would be 3.0 per cent and 0.7 per cent. In this connection it will be noted that the ratio of oxygen to total volatile comes out as between 50 and 60 per cent, as distinguished from a ratio of 86 per cent noted by Johnson[6].

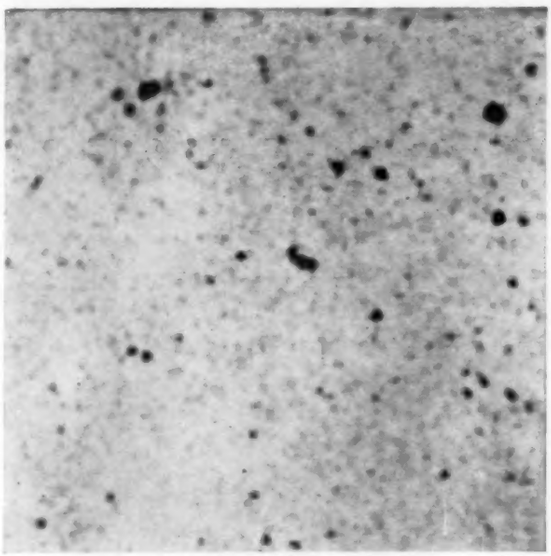

Fig. 1—Rubber Black
Magnification X2000

We must therefore conclude that the removal of a considerable proportion of the oxygen originally present in this carbon black, together with the carbon burned up to supply the mixture of CO and CO_2, has had the result of so altering the surface as in large measure to reduce its activity towards D.P.G.; at the same time, however, somewhat increasing its adsorptive activity towards hydrochloric acid.

The possibility of such differences in adsorption being due to an alteration in the effective particle size of the black, although improbable, must of course be first considered before definitely accepting this change as due to a chemical alteration of the surface. The evidence seems reasonably clear, although indirect.

Microscopic Evidence

In Figures 1-2 are shown the microphotographs representing black before and after heat treatment. It is true that the microscope is not as yet sufficiently refined to bring out the ultimate differences in particle size of impingement carbon blacks. No microscopic arrangement is known which is capable of resolving below 80 $m\mu$, and there is reason for considering the particle size of impingement carbon black as ranging from this figure down to as low as 20 $m\mu$.

Nevertheless these photographs will tend to eliminate the possibility of any very large increase in particle size as a result of heat deactivation.

Physical appearance, fluffiness, apparent volume, ability to absorb linseed oil and other liquids, also indicate no significant difference in particle size.

Finally there is the evidence of rubber compounding tests. The stress-strain curve developed by the heat deactivated black used in the above experiments resembles that of the control in all respects save that of modulus, or stiffness, the modulus being higher in the case of the heat deactivated black. The reason for this difference is not clear. That it is due to the presence of flocculates or agglomerates in the rubber mixing would seem to be excluded by the fact that the tensile strength, proof resilience and resistance to abrasion of rubber compounds made up with this type of carbon black are in most cases higher than in the case of controls. It is difficult to conceive that the development of higher modulus, if due to agglomeration, could simultaneously result in enhanced tensile and energy properties. On the contrary, the evidence from rubber compounding tests suggests that the specific surface developed by this type of carbon black is if anything greater and not less than that for untreated carbon black.

The conclusion seems to be that the difference in adsorptive activity must be accounted for by the elimination of carbon and oxygen in the form of carboxyl-like surface compounds, of acid forming tendencies. It should not be supposed that carbon black contains a removable, or rather water-soluble, acid. Prolonged extractions have repeatedly failed to isolate any acid reacting material.

Nevertheless the putative carboxyl radical, present on the surface of the carbon black, may readily be expected to show preferential adsorption towards alkaline substances, together with reduced activity towards acidic substances.

The elimination of this complex may also be expected to reduce the alkaline activity and to increase the activity towards acidic substances.

The profound effect of removal of oxygen is illustrated by the data in Table VIII.

TABLE VIII

			% Adsorption from .01 *N* Solutions			
			Alcoholic		Aqueous	
	Volatile	*% Oxygen*	*DPG*	*Benzoic Acid*	*KOH*	*HCL*
Rubber Black						
Normal	5.0	3.0	11.2	4.5	20.1	4.2
Deactivated	1.5	0.7	6.2	6.4	6.6	13.0
Paint Black						
Normal	5.7	3.7	49.1	16.2	47.3	21.5
Deactivated	2.0	1.5	44.8	22.4	9.6	37.5
Ink Black						
Normal	13.5	7.2	57.7	18.4	98.2	7.3
Deactivated	1.7	1.5	21.0	24.8	1.5	43.0

The effect of deactivation is equally striking for paint and ink blacks as for rubber black.

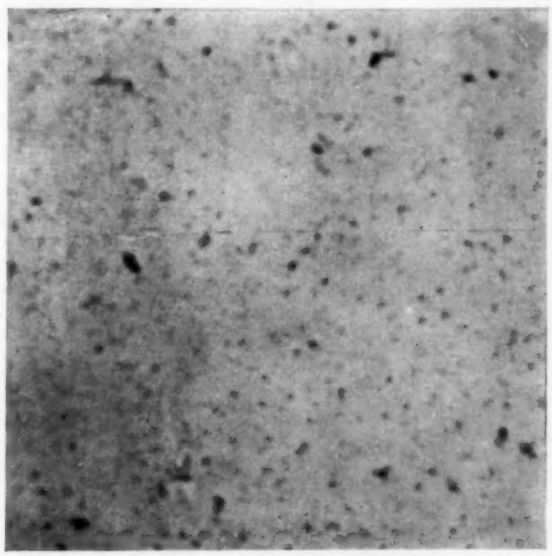

Fig. 2—Deactivated Rubber Black
Magnification X2000

The effects of volatile matter removal are a reduction in the adsorptive activity towards D.P.G., a still more marked reduction in adsorptive activity towards .01 *N* KOH solution, but in the case of hydrochloric and benzoic acids, of similar strength, *the effect of deactive heating has been to increase the adsorption.*

In the adsorption paper it was noted that when comparing adsorption towards D.P.G. with that towards hydrochloric acid, both being calculated on a molar basis, the effect of deactive heating was to reduce the asymmetry by decreasing the former and increasing the latter.

A study of Table VIII shows that when the adsorption is re-

*The grade sold as "Micronex" was used for these experiments.

ferred to KOH instead of D.P.G. the effect, instead of being to reduce the asymmetry, is to reverse it. That is to say, where normal rubber black, paint black and ink black show a strong selective adsorption for KOH, these same blacks, after removal of volatile matter, show marked selective adsorption towards HCl solution.

It is clear from this that the adsorptive behavior of normal and of heat deactivated carbon black cannot be conditioned simply by acidity or alkalinity. When the behavior towards D.P.G. is compared with that towards KOH, and on the other hand, that towards hydrochloric acid is compared with that towards benzoic acid, it will be found that the change in adsorptive activity induced by "deactive" heat is less in the case of the organic compound than in the case of the inorganic. Whether this peculiarity is a question of ionization or of "polar" activity in the case of the organic molecules is a matter now being further studied in this laboratory.

An interesting analogy to the above phenomena is found in the researches of Kruyt and de Kadt[10] on sugar chars. These investigators noted the marked change in adsorptive activity towards sodium hydroxide solution when the charcoal was heated to 1000° C. in an atmosphere of CO_2 or in vacuo.

From the foregoing it is evident that the expression "deactive heating" strictly speaking holds true only as regards the behavior towards alkaline substances. With regard to acids, the removal of volatile matter and of oxygen might more accurately be described as active heating. However, in view of the practical importance of carbon blacks rendered "deactive" towards the great majority of rubber accelerators, we have preferred to continue the expression in its original form*.

Effect of Volatile Matter on the Electrical Charge

According to Kruyt (loc. cit.) when working with sugar char the untreated carbon is negative in pure water. On heating to 1000° C. he found that the carbon took on a positive charge in water.

Accordingly, the three typical carbon blacks already mentioned, namely, rubber black, paint black, and ink black were dispersed in a series of ionizing, semi-ionizing, and non-ionized liquids and the electrical charge determined either by the direction of motion of the meniscus in a Burton U-Tube or by means of a cataphoresis cell under the microscope. All three types of carbon black, as also "deactive" heated rubber black (showing a range in oxygen content of from 0.7 per cent to 7.2 per cent) showed a negative charge in water, amyl acetate, .01 *N* KOH solution, and .01 *N* HCl solution.

On the other hand, all of these blacks showed a positive charge in turpentine, with evidence of slight positive charges also in the case of nitro-benzene. In view of the fact that the deactivation procedure in our experiments was not carried out in exactly the same way as that of Kruyt, we are not prepared to say that the above results definitely prove that the electrical charge phenomena as noted by Kruyt for the case of sugar chars are entirely inapplicable in the case of carbon black. In fact, in the case of heat deactivated rubber black the positive charge in turpentine, as judged by rate of cataphoresis, was somewhat greater than in the case of the control. It does seem clear, however, that in the great majority of liquids, including water, the tendency for carbon blacks is to assume a negative charge irrespective of volatile matter or oxygen content.

Effect of Volatile on Wettability

In this connection a review of considerable data from this laboratory indicates that standard ink black, which has a very high volatile and oxygen content, tends to show superior dispersing qualities in water, alcohol and most of the liquids used. On the other hand, when similarly tested, standard rubber black disperses more easily than the paint black although having a lower volatile and oxygen content. One is, therefore, driven to the conclusion that the superior dispersibility or wettability of the ink black is due to some factor other than merely its higher volatile content.

Effect of Volatile on Dispersibility in Rubber

It is now generally recognized that the attainment of satisfactory dispersion of any pigment in rubber requires "high viscosity," or stiff, mixing. The forces which regulate the dispersion of carbon black in rubber would, therefore, be expected to be the shearing action on the rubber roll or mixer rather than the minute attractions and repulsions which are so decisive in the case of paint, ink, and lacquer media.

That this is indeed the case is shown in Table IX and Figure 3.

TABLE IX

Mixing

Rubber	100
Black	45
Litharge	6
Zinc Oxide	5
Sulphur	4
Stearic Acid	10
	170

Cure:—30 minutes at 288° F.

Sample	*Volatile*	300% *Modulus* Kg./sq.cm.	*Tensile* Kg./sq.cm.	% *Elongation*
Ink Black	13.5	78	310	670
Rubber Black	5.0	81	310	650
Commercial Deactivated Rubber Black	3.5	91	310	640

Here are seen results on the rubber stress-strain curve of carbon blacks representing normal, very high, and very low volatile matter. The mixing selected for this test was accelerated with litharge plus fatty acid in order to iron out the wide differences in curing rate characteristic of these three blacks. Any significant difference in the dispersibility of high vs. low volatile carbon black in rubber would be expected to show up either in the appearance of the raw cut surface or in the shape of the stress-strain curve after cure. No such evidence is apparent.

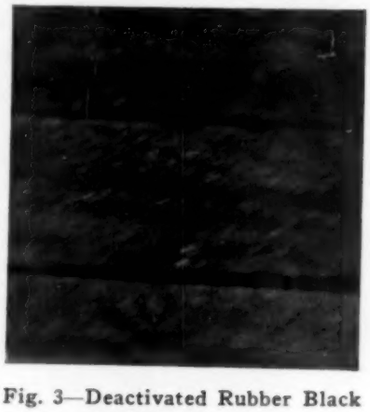

Fig. 3—Deactivated Rubber Black
Rubber Black
Ink Black
Magnification X7

This should not be taken as implying that all types of carbon black are equally easy to disperse in rubber. The contrary is of course the case. High color paint blacks, for example, are much more difficult to mix in than standard rubber black. This difference is however not due to the presence of more volatile matter or oxygen. The highest quality of paint blacks contain, as it happens, almost the same amount of oxygen as standard rubber black. The differences in miscibility must, therefore, be attributed to other factors.

Effect of Volatile Matter on Rubber Curing Properties

The intimate relationship between volatile matter and curing behavior has already been pointed out [3, 6, 14]. An attempt will here be made to evaluate this relationship in a quantitative manner: firstly by taking the whole range of carbon black qualities, secondly by confining the study to standard rubber carbon black.

In Table X are shown five different qualities of channel carbon black of which sample No. 5 is a paint black, the other four being rubber blacks of various qualities. The cure in each case was that which gives good results for standard quality rubber black (sample No. 2). It is seen that various differences in curing behavior coexist with practically constant volatile matter.

*The reversal of the asymmetry of the adsorption curve (as between .01 *N* KOH and HCl solutions) would not seem to follow directly from the concept of removal of a CxOy complex of carboxylic character. It is hoped to discuss this point in a future member of this series of studies.

TABLE X
Effect of Volatile on Rubber Properties
Mixing

Rubber	93.00
Black	35.00
Zinc Oxide	3.00
Sulphur	5.00
D.P.G.	0.75
	136.75

Cure:—30 minutes at 288° F.

Sample	*Volatile*	500% *Modulus* kg./sq. cm.	*Tensile* kg./sq. cm.
2	6.0	183	338
12	5.7	162	310
6	5.5	148	295
7	5.9	144	246
5	5.5	74	167

On the other hand in Table XI are shown five rubber carbon blacks all of which when similarly tested show satisfactory physical properties. At the same time the volatile matter shows rather wide variation.

TABLE XI
Mixing

Rubber	93.00
Black	35.00
Zinc Oxide	3.00
Sulphur	5.00
D.P.G.	0.75
	136.75

Cure:—30 minutes at 288° F.

Sample	*Volatile*	500% *Modulus* kg./sq. cm.	*Tensile* kg./sq. cm.
1	4.5	197	330
3	4.7	162	338
11	4.3	165	316
12	5.7	162	310
2	6.0	183	338

These two tables show beyond any doubt that carbon black of the same volatile matter content may show large discrepancies in rubber curing behavior, and that differences of 25 per cent in the volatile matter may coexist with satisfactory rubber curing properties.

Volatile Matter as a Quality Test for Standard Rubber Black

Determination of volatile matter has for years been employed in these laboratories as a secondary quality index both for research and for field control purposes. The use of a D.P.G. adsorption test for similar purpose has already been described.[1]

In order to convey a quantitative idea of the extent to which the volatile tests reflect the true vulcanizing properties of a rubber black we show in Table XII a frequency table which brings together the volatile and the rubber curing properties.

TABLE XII
Frequency Table
Standard (Rubber) Carbon Black—
Volatile vs. Mean Modulus in Rubber
Mean Modulus—Kg./sq. cm.

% Volatile	Less than 120	120.0 123.4	123.5 126.9	127.0 130.4	130.5 133.9	134.0 137.4	137.5 140.9	141.0 144.4
7.0-7.4	1	....	....	....	....	....	....	....
6.5-6.9	1	....	....	....	....	....	....	....
6.0-6.4	1	....	....	....	....	....	....	....
5.5-5.9	3	1	....	....	1	1	....	1
5.0-5.4	....	1	4	1	4	3	1	2
4.5-4.9	....	1	5	3	7	9	4	1
4.0-4.4	1	1	....	11	7	3	3	1
3.5-3.9	1	1	2	2	6	....	4	1
3.0-3.4	....	....	....	....	....	....	....	....

These data were arrived at as follows:—

A series of 100 control tests was taken at random from our laboratory records. The black was of standard rubber quality manufactured in various units of similar constuction.

The rate of cure in rubber was arrived at by a weighted modulus obtained by averaging the stress at 300 per cent and at 500 per cent, these values for the 30 minute and 40 minute cure being also averaged. The net effect was approximately the selection of a modulus at 400 per cent for a 35 minute cure; the probable error being however reduced.

This criterion is of course subject to any error due to any inherent variation in stiffening quality of these various samples of carbon black, distinct from their rate of cure. This matter has received close study and it has been found that various carbon black plants when arranged for the production of any one quality of black will show no significant changes in stiffening power provided there is no drastic change in the composition of the natural gas.

The lack of correlation is fairly evident from inspection of the table. It may also be remarked that while none of the samples which showed a volatile greater than 6 per cent were in the normal curing range, values for volatile lower than 6 per cent by no means sufficed to guarantee satisfactory curing behavior.

The actual coefficient of correlation for the above series of 100 determinations, using Pearson's formula, was 0.24 ± 0.064. It will be seen that the coefficient is very low and is also less than six times its probable error. A similar set of frequency data in the case of the D.P.G. adsorption tests[1] showed a correlation of 0.46 ± 0.05; thus indicating a much higher degree of correlation in the case of the adsorption test than in the case of the volatile matter test.

Critical Comparison of Volatile Matter vs. Adsorption Test as Quality Index for Rubber

It has been shown that the volatile matter present in carbon black comprises, as by far its most important factor, oxygen. This oxygen is most probably present in the form of a carboxyl radical which endows the surface of the carbon black with a strong preferential adsorptive activity towards alkaline bodies.

Reduction in the volatile matter with concomitant reduction in the carbon-oxygen complex has been shown to diminish D.P.G. adsorption at the same time slightly increasing acid adsorption. From this it can readily be understood that for the great majority of organically accelerated rubber compounds the rate of cure when referred to a given development of surface by the carbon black, may be largely governed by the oxygen (volatile) content.

If, however, the surface developed per unit weight of carbon black should also change then the volatile matter could no longer be expected to be the sole controlling factor in accelerator removal and therefore in rate of cure. Such differences in specific surface, or, which is the same thing, particle size, do however exist and therein would appear to lie the explanation of the higher degree of correlation observed in the case of the D.P.G. adsorption test. The matter may be summed up in the statement that whereas the volatile matter may control the intensity factor (adsorptive activity per unit surface), fineness of particle or specific surface furnishes the capacity factor of the adsorptive activity. The direct adsorption test tends to reflect both factors, the volatile matter evaluating only one.

In explanation of the fact that even the adsorption test falls considerably short of 100 per cent correlation, it may be pointed out that the rubber matrix cannot be expected to furnish ideal conditions for the attainment of an adsorption equilibrium similar to that which takes place when a sample of carbon black is shaken up with an alcoholic solution of an accelerator. Add to this the disturbance, by adsorption, of the fatty acid which is also essential to the proper functioning of organic accelerators during cure, and it is indeed surprising that even the D.P.G. adsorption test should parallel, so well as it does, the actual vulcanizing behavior.

Industrial Application of Low Volatile Black

Standard rubber carbon blacks with lower volatile matter, lower oxygen, and reduced adsorptive activity towards organic accelerators are now available*[13] In the field of rubber these carbon blacks when used with existing dosage of accelerator permit of vulcanization in shorter time or at lower temperature, yield higher tensile strengths, higher modulus values, together with higher proof resilience. When so compounded as to maintain approximately unchanged rate of cure they permit of considerable saving in accelerator dosage, the amount of permissible reduction showing rather wide variation with different types of organic accelerators. The

*Ultramicronex.

proper dosage should therefore be determined for each type of sulphur-accelerator-fatty acid, curing combination.

Another Application

The new deactivated carbon blacks show much less tendency to regain moisture from the atmosphere during shipment and storage. Containing as they do a higher percentage of fixed carbon with less entrained gases, they seem to offer advantages where such impurities are capable of causing trouble. Examples are rubber goods which are vulcanized in open air or steam, in which case the tendency towards blistering and micro-porosity is reduced, carbon paper, shoe polish, gramophone records, etc.

Another interesting property of these new blacks has recently come to our notice. It would seem that their reduced adsorption activity acts in a beneficial manner on paint films. As is well known carbon black paints are notoriously slow in drying. Some recent experiments seem to indicate that the deactivated low volatile carbon blacks show less interference with the action of the dryers and so appreciably accelerate the rate of drying of the finished paint. It must be pointed out however that this work is in its early stages and the above remarks are to be taken as only qualitative and preliminary.

SUMMARY

(1) The volatile test is described in detail. Meticulous care in the fit of the lid, charge of black, control of temperature and of time of heating are essential to consistent results.

(2) Differences in volatile matter in different types of carbon black cannot, as suggested in the literature, be explained by temperature of formation.

(3) The composition of the volatile matter evolved from carbon black as given in the literature is critically discussed with particular regard to the lower values reported for heating in vacuo.

(4) The nature of volatile matter is also determined from combustion analyses before and after "volatile" removal. It consists essentially of oxides of carbon which were presumably attached in the form of a C_xO_y complex.

(5) Removal of oxygen is shown to decrease the adsorptive activity towards alkaline substances, notably organic accelerators of vulcanization. This effect has been termed "deactivation."

(6) Microscopic and other data preclude the possibility of such changes being due to altered particle size.

(7) Whereas normal rubber black, paint black and ink black show a strong selective adsorption for KOH in .01 *N* solution, these same blacks after "deactivation" showed selective adsorption towards HCl.

(8) These changes in adsorptive activity induced by "deactive" heating appear to be less in the case of organic than in the case of inorganic acids and bases.

(9) In most liquids, including water, the tendency for carbon black is to assume a negative charge irrespective of volatile matter or oxygen content.

(10) The superior dispersibility of ink black is not due merely to its higher volatile content.

(11) Blacks of normal, very high, and very low volatile matter, on being mixed in rubber compounds and compared as to stress-strain properties and microscopic appearance of the uncured, cut surface, showed no worth-while differences. Volatile matter is therefore not an index to miscibility in rubber.

(12) Taken over a wide range of carbon black qualities, volatile matter is not a guide to rubber curing behavior.

(13) For standard rubber black, the volatile test correlated with rate of cure to the extent of $0.24 \pm .064$. This value is approximately half the correlation coefficient for the D.P.G. adsorption test. This is due to the volatile matter's controlling only the intensity factor of adsorptive activity, whereas the D.P.G. adsorption test includes also the capacity factor (specific surface).

(14) Some industrial applications of the new, low-volatile carbon blacks are briefly discussed.

Acknowledgment

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The Scrap Rubber Situation

THE scrap rubber market has suffered along with the decline in crude rubber prices but the situation in the scrap trade is not without encouragement. Despite the fact that certain specific reclaims are selling at about 5½ cents per pound against 7 cents for crude, the gravity comparison makes the crude a much cheaper article. However, there are many places where reclaim has won itself a place of permanence. Its position is not based on price but because in certain mixtures it is better than straight crude, for certain purposes. It is found to save labor and time in many processes.

Regardless of how cheap crude is, therefore, the scrap trade can comfort itself that there will probably always be a market for the reclaim. The latter is raised to a new dignity for in the past it was thought of almost entirely as a cheapener because the price, pound for pound, was less. That situation will occur again but in the meantime reclaim holds its market because of its merit.

Prices during the past month have been very easy. Dealers have found it well nigh impossible to sell some items such as red tubes and boots and shoes. Nominally, the shoe stock is worth around 75c in the trade. Solid tires are not so firm as a month ago and we have heard of sales from the $19-$20 delivered eastern points, in one case $18. A diminished but fairly steady beadless tire movement continues to Akron at $12.50 to $13 and at $9.50 to $10 for straight mixed. For eastern deliveries these prices are shaded by as much as $1.50 per ton.

Dealer warehouse purchases are being made around 1.20c-1.30c for mixed tubes, and $4-$5 for mixed tires. An occasional parcel of No. 1 tubestock of export quality is traded around 3c f.a.s., possibly an eighth more in some cases, but export demand has been light. Some exporters have shifted their purchasing from New York City and found cheaper lots available elsewhere along the Atlantic seaboard.

An interesting comparison of scrap rubber prices is given below:

	June 13	*Month Ago*	*Year Ago*
Crude; Standard Smoked Sheets, lb.	6.12½c	6.50c	12.25c
Mixed Tires, Akron, ton	$9.50-$10.00	$10.00-$10.50	$14.00-$14.50
Beadless tires, Akron.....	$12.50-$13.50	$13.00-$13.75	$17.00-$18.00
Mixed tubes, N. Y., lb.....	1.20c-1.30c	1.25c-1.40c	2.50c-2.75c
No. 1 tubes, N. Y., lb.	2.75c-3.00c	3.00c-3.25c	6.00c-6.25c

Liberian Labor and the Firestone Plantation

A Study of Conditions Completely Vindicates the Firestone Company of the Charge of Using Forced Labor—Company Is Largest Employer of Labor—Payroll Exceeds $1,000,000

IN an interesting series of articles appearing recently in the *New York Evening Post*, George S. Schuyler, a special investigator sent to Liberia by this paper, gives a comprehensive account of the labor conditions on the Firestone plantation on the Du River in Liberia. In the light of the recent charges of slavery and forced labor in Liberia, Mr. Schuyler's story completely vindicates the Firestone company from any implications in such traffic. The part of Mr. Schuyler's article dealing with the conditions he found on the Firestone plantation is quoted below:

"I left Monrovia at noon, February 28, by automobile, for the forty mile trip to the Du River Plantation of the Firestone company. The dirt road, perhaps the best in Liberia, is none too good. Nothing whatever has been done to it for over a year and consequently it is necessary to drive with caution. The trip requires all of three hours.

"To motor into this largest of the three Firestone plantations, is to enter a totally different world, a picture of what this beautiful country might be under intelligent control. In just eight years a model development has been carved out of what was almost impenetrable jungle. The miles of roads running in all directions, well crowned, rained and bridged, could hardly be improved, and workers, clerks and superintendents are well housed. There is a modern 100-bed hospital completely equipped, offices, a general store with ice plant adjoining, sawmill, machine shops, water and electric light plants and a wireless station. It is indeed, a little American colony in the heart of wild Africa.

"The management boasts that this task has been accomplished almost wholly with native labor, exceptions being clerks and superintendents. Liberians were first employed as clerks, but were found to be so troublesome, litigious and inefficient that they had to be replaced by Negroes from the Gold Coast, Nigeria and Sierra Leone. There are some Liberian foremen remaining, but many have been replaced by natives. The superintendents are all Americans with the exception of the director of the tree nursery, a Dutchman.

Firestone Largest Employer

"The Firestone Company is the largest employer of labor in Liberia and quite naturally considerable interest must attach to its treatment and payment of that labor. I found that the workers get the standard Liberian wage of one shilling a day, six pence being deducted for food. Skilled workers like chauffeurs, mechanics, nursery workers and so forth, receive from one to four shillings a day. In the beginning, common laborers were paid from two to four shillings a day,—fabulous wages for Liberia, —but the Government objected, saying that Liberian farmers were protesting on the ground that the high wages drew away their labor. Even bank clerks in Monrovia get but two pounds, ten shillings a month. At one time

Liberian Plantation Laborers Recruited from Various Tribes of the Interior

the Firestone Liberian payroll exceeded $1,000,000 annually.

"The laborers work at will, only a small percentage ever drawing a full month's salary. Out of a total of 3,000 workers now employed on the Du River plantation, 66 per cent turn out daily. So there seems to be nothing to the rumor that the men are driven.

"The workers are housed in sixteen camps resembling diminutive native villages. Each camp is ruled by a native headman elected by the workers and under whose direction they perform their daily tasks. The men will not work under undesirable headmen and the company respects their wishes. I found the camps neat, clean and sanitary, much more so indeed than Monrovia. There are seldom members of more than one tribe in a camp.

Natives Are Skilled

"The company has a nursery of 545,000 young rubber trees and the delicate work of grafting is done entirely by natives. The automobiles and trucks are operated and largely repaired by natives and they do much other work requiring skill, such as constructing roads and culverts and building concrete bridges. Some day, it would seem, Liberia should greatly profit from the training these na-

tives are receiving and which they could get nowhere else in the republic.

"Seeking the Firestone Company's answer to the criticisms made by President Barclay, of Liberia, on some of the activities of the Firestone Company in connection with recruiting labor and the slavery charges, I went to the office of W. D. Hines, the resident manager of the Firestone plantation, who has been in Liberia since the beginning of the project. Mr. Hines was rather wearily amused by the remarks of the Chief Executive, but politely proceeded to relate the whole history of the company's efforts in Liberia.

"In answer to my question concerning the President's claim that the Firestone Company had insisted the Government must build roads so that rubber might be taken to port, Mr. Hines drove me in his car to Landing No. 10 on the Du River, where there are warehouses, a small dock and several large motor launches moored. He explained that such rubber as has been produced is shipped from that point to the mouth of the river at Marshall, where it is loaded aboard ship, thus making completely unnecessary transportation by land. He pointed out that the small and much older Mount Barclay plantation sits astride of a Liberian road that was constructed long before the Firestone Company entered the country.

Denies "Pressure" in Recruiting Labor

"When I mentioned the accusation of President Barclay that the Firestone Company, through the American Legation, sought to get the Government to use pressure to increase the flow of labor to the plantations, he replied:

"'There was always a sufficient supply of labor until former District Commissioner David Carter (now jailed on charges of murder) began to interfere with laborers en route to the plantations in order to extract illegal fees from them or to divert them to forced labor on the Government roads.'

"'Upon being requested to stop the practice, Commissioner Carter referred me to the then President King. I immediately took up the matter with the President, but the only thing he would say was that if the American Minister would make the request that the Firestone Company be supplied with more labor it would be furnished.'

"'I replied that I could make no such request of the American Minister, nor could I see where he had anything to do with it. A high Liberian official was interfering with our labor supply and I was merely asking that this interference cease. However, President King communicated with Mr. Francis, who was then American Minister, concerning the matter. Mr. Francis replied at first that he would have nothing to do with the matter. Upon King's further insistence, Mr. Francis stated that he saw no reason why an American corporation should not be permitted to have all the labor it desired.'

"Mr. Hines expressed the opinion that the whole scheme was to make the American Government appear to be forcing the Liberian Government to supply the Firestone Company with labor. I discovered later that there was not a shred of correspondence in the files of the American Legation to support President Barclay's charge.

"The Firestone manager stated, in answer to the charge that his company inspired the League of Nations investigation, that as they had never had any difficulty in getting sufficient labor, except when interferred with by Liberian officials, there was no reason for the company to complain against the exportation of a few hundred laborers. He mentioned the fact that years before Liberia had been criticized for permitting this traffic in "boys" and that Thomas J. R. Faulkner, wealthy merchant and head of the People's Party, had been a frequent and outspoken accuser of Government officials in that connection. He suggested that perhaps Faulkner's charges may have speeded the investigation.

"It is true that 15,000 laborers are a whole lot to recruit from the scattered Liberian villages, and one might be excused for crediting rumors that force was used. And yet, from my travels in the interior, where money is so scarce and so desired, I can see where even at the peak of its operations the Firestone Company needed no force to get labor."

Crude Rubber Production Costs

THE average cost of producing rubber on estates has been reduced to a figure deemed impossible in 1928, according to reports to the Department of Commerce. Exact and comparable figures on cost of production are seldom available for large groups of companies, but reasonable approximations can be easily calculated, and a compilation covering 79 Malayan sterling companies indicates that the average annual total expenditures of these estates, figured in pence per pound of rubber, has been as follows:

Net Expenses of 79 Malayan Estates
(Pence per Pound of Rubber)

1921	12.23	1926	9.86
1922	8.29	1927	10.30
1923	9.52	1928	8.41
1924	9.08	1929	6.28
1925	8.48		

These figures show how drastically expenses were pruned in 1922 compared to 1921. They show that economies instituted in 1922 were continued thereafter, in spite of restriction causing operating costs to increase. Following the abnormally high prices of 1925-1926, there was temporary increase in expense, owing partly to greater liberality in bonuses to estate managers and partly to increased wages, shipping costs, brokerage fees, etc. In 1928, on a growing but curtailed output and with wages unreduced, expenses came down notably; in 1929, full outputs brought still further reduction. Comparable 1930 statistics are not available, but it is probable that average expense for these 79 estates for 1930 would be below 5.50 pence in spite of the May tapping holiday; wages and salaries have been reduced, all sorts of economies have been discovered and put in force. A goodly number of large estates have reported costs under 5 pence. If past history (1921-1922) is repeated, the cost of production will not again increase sharply; many economies that have been adopted will become permanent. There has been a conclusive demonstration of the fact that cost of production is not a static figure, but a dynamic one which changes constantly with conditions; and that what constitutes a price that will give a fair profit is not capable of being arbitrarily fixed over a long period.

Rubber Plantings in Soviet Russia

AN article in the May 5 *La Vie Economique des Soviets* says that the expected planting of rubber during 1931 in Russia is:

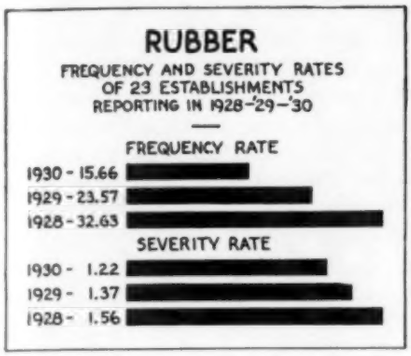
Region and Plant	*Area in Hectares*
Kazakstan, *chondrilla*	5,000
Kazakstan, *taou-saguyz*	14,000
Azerbaidjan, *guayule*	1,000
Turkmenistan, *guayule*	500
Ukraine, *vatochnik*	200

The taou-saguyz is described as a native rubber-bearing herbaceous plant, which grows wild chiefly in Kazakstan; vatochnik is described as a less rich rubber bearing plant.

Safety in the Rubber Industry

PLANTS in the rubber industry reporting their accident experience have records that place the industry in the front rank of industrial safety. In 52 establishments whose employees worked 179,000,000 man-hours during 1930, the frequency rate was only 12.48 and the severity rate 0.83 as compared with rates of 18.47 and 1.97 for all industries. These rates gave the industry a standing of sixth in frequency and fifth in severity among the 28 major industrial groups.

Injuries were less frequent and less severe, and fatalities were fewer, in establishments manufacturing mechanical rubber goods than in tire plants. The frequency and severity of permanent partial disabilities, on the other hand, is higher in the manufacture of rubber goods than in tire plants.



Frequency rates decrease as plants increase in size, as shown in the accompanying table. This is also true for all industries. The experience of over 3,800 plants in all industries, however, shows that severity rates, too, decrease as plants become larger. The reverse is true in this industry, however. The bigger the plant, the higher is the rate. This may be because tire plants, with higher severity, tend to be large. Exceptional reductions of 52 per cent in frequency and 22 per cent in severity since 1928 are shown in the accompanying chart. These decreases far exceed those for industry as a whole, and speak well for the safety efforts of the rubber industry in particular.

Injury Rates, 1930, by Size of Establishment, Rubber Industry

No. of Employees	*No. of Establishments*	*Man-Hours Worked (Thousands)*	Rates *Frequency*	Rates *Severity*
1-99	3	507	33.53	.32
100-249	8	3,275	16.18	.33
250-499	8	5,547	14.96	.48
500-749	8	10,571	15.23	.62
750-999	3	4,960	12.30	.75
1,000-up	22	154,041	12.05	.87
Total	53	178,901	12.48	.83

Rubber Heels and Soles in Sweden

THE chief products of the Swedish rubber industry are rubber overshoes and galoshes, the output of which suffices to supply the needs of the home market and to furnish large quantities for export, according to U .S. Consular reports. However, partly as a result of the international depression, and partly owing to the increasingly protectionist policy of the countries which constitute the chief foreign markets, exports of rubber footwear from Sweden in 1930 declined to approximately 50 per cent of the 1929 volume. In addition to footwear, the local industry produces tires, hose and tubing, mats, balls, rubber stamps, and other articles, but not in sufficient volume to fill domestic needs.

General conditions in the industry have not been entirely satisfactory during the past year. The smaller volume of export trade, together with reduced domestic sales on account of exceptionally dry weather during the winter of 1929-30, resulted in a surplus of stocks on hand in the summer of 1930. Furthermore, three of the largest factories, two of which are located within the Malmo consular district, were affected at the beginning of the present season by a strike which entirely stopped production for three months beginning July 30, 1930.

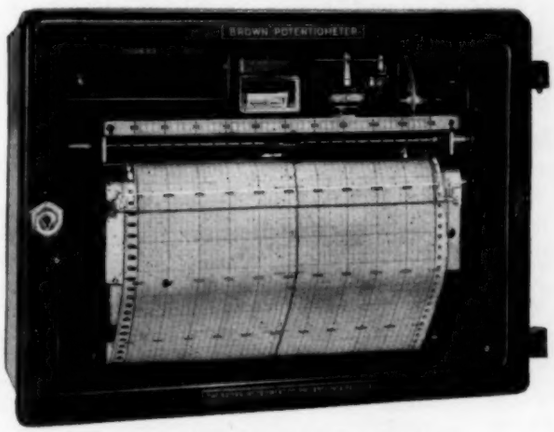
Of the various Swedish producers of rubber goods, five are engaged in the manufacture of rubber soles and heels; these firms are the following: Halsingborgs Gummifabriks Aktiebolag, Halsingborg; Tralleborgs Gummifabriks Aktiebolag, Tralleborg; Skandinaviska Gummi Aktiebolaget, Viskafors; Svenska Gummifabriks Aktiebolaget, Gislaved; and Uppsala Gummifabriks Aktiebolag, Ulvsunda.

Official Swedish statistics do not show production figures for rubber heels and soles. From sources within the industry, however, it is learned that production of these items has risen from 250,000 kilos in 1926 to about 455,000 kilos in 1930.

New Brown Potentiometer Pyrometer

THE Brown Instrument Company, Philadelphia, Pa., is placing on the market a new null type potentiometer pyrometer, which will indicate, record and automatically control temperature with extreme precision. The prime object in the development of this instrument was to produce an extremely accurate pyrometer to meet the requirements in modern industrial practice and sufficiently rugged to withstand the severe conditions met with in industry.

The Brown potentiometer pyrometer incorporates some 53 features new to potentiometer pyrometers, including a positive driving mechanism controlled by the galvanometer



Brown Potentiometer Pyrometer

and exerting minimum force on the galvanometer pointer and a long 40" slide wire enclosed in glass and which can be immersed in oil where desired for protection from corrosive gases and vapors. Another improvement is an automatic compensator which corrects the pen position for expansion and contraction of the chart paper with change in humidity of the atmosphere. The oblong holes in a strip chart are necessary to permit of this expansion and contraction with change in humidity and this movement of the chart can cause an error of as much as 1 per cent of full scale value if not corrected for.

Automatic temperature control is obtained through mercury switches which can handle up to 25 amperes directly, without the use of relays. The case has been so designed that the instrument can be mounted on a wall, on a table, or either front-of-board or flush mounted on a panel board.

EDITORIAL COMMENT

Foreign Branch Factories and Export Trade

THE policy of American rubber manufacturers, particularly those in the tire industry, of establishing branch factories in foreign countries to secure an advantageous position over competitors in costs of distribution and labor, and the failure of the domestic manufacturers of other rubber goods to reap the benefits of combined effort in foreign trade, under the Webb-Pomerene Act, were recently criticised by Everett G. Holt, chief of the Rubber Division of the Department of Commerce, in a talk before the members of the Akron Export Club, at Akron on June 24.

There is no doubt that the decline in exports of rubber goods has been due, not alone to the general world depression, but in no small measure to the foreign manufacturing branches of several of the larger American concerns. Within the last few years there has been rush to set up factories in the leading foreign markets. There are obvious advantages in such a policy but there are often several hidden disadvantages which make themselves felt in such economic periods of distress as we have been going through. Branch factories abroad do not necessarily hold the foreign market for the American manufacturer in times of depression, but in turn help to aggrevate the situation at home by the displacement of labor and output which would have otherwise occupied the home factory. There is much to be said on both sides. Mr. Holt points out also that such export trade in tires as has held up through the depression has been due to the cooperation through the Webb-Pomerene export corporation, maintained by the leading tire companies and in spite of foreign branch factories. Mr. Holt has taken a courageous stand in calling attention to the disadvantages of export branch factories and it would be interesting to know the reaction of the leading tire executives to his remarks.

In urging the manufacturers of rubber goods other than tires to take advantage of cooperative effort through the organization of an export trade corporation under the Webb-Pomerene Act, he also makes a very sound and construction suggestion. Such operative effort for foreign trade could not but help materially in meeting foreign competition and in expanding the markets we already enjoy. Some of his remarks are well worth quoting here:

"Our export trade in tires," Mr. Holt said, "in spite of a growing number of foreign branch factories, has held up better than any other line. To a considerable degree I believe this is because most of the companies exporting tires co-operate through a Webb-Pomerene export corporation and have facilities through which to present a united front to foreign competitors. Not all difficulties are capable of solving through this corporation, but much has been accomplished in maintenance of uniform prices and policies.

"Those associated companies might be able sometime to agree among themselves, perhaps in co-operation with leading foreign competitors, on a uniform policy regarding foreign branch factories. Facilities for producing tires sufficient for world needs exist to superfluity, but the desire to lower distribution costs and get inside the tariff barrier of certain large foreign markets is tempting and leads to further over-capacity. *Perhaps the time will come when the leading tire companies engaged in international trade will give consideration to an agreement not to establish branch factories in any additional countries.* (The italics are ours).

"Tire manufacturing would not develop rapidly abroad without the backing of these leading companies; the technical problems involved make for concentration of production in the hands of companies with highly trained chemical, engineering and research staffs which small ventures could not possess. Retarding branch factory development would help to maintain production at a higher rate in the home factories of each company and give added domestic employment. There is another good reason for not carrying the branch factory idea too far, and that is the uncertainty of political security in some countries and the possibility of unforseeable but very detrimental tariff changes and tax changes.

"Just as there has in recent years been a tendency to establish branch tire factories in foreign countries, there has been a similar tendency toward decentralization here, which has had the effect of shifting employment away from Akron to some degree. The prime purpose for establishing branch factories here or abroad is to get an advantage over competitors in costs of distribution and, incidentally, labor. It is certain that existing manufacturing facilities are already more than ample, and that the communities where the factories are now located need the employment, and also that decentralizing the industry further would not help Akron in any way."

The RUBBER AGE

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Representatives in all the rubber centers of the United States, Canada, England, France, Germany and the Middle East.

The Rubber Industry's CURRENT NEWS

Financial—Personals—New Rubber Products—
Building Operations—Manufacturing—Exports

NEW MERCHANDISING PLAN BOOSTS GILLETTE SALES

That the unique merchandising plan adopted in 1929 by the Gillette Rubber Company, Eau Claire, Wis., is largely responsible for the company's increase in sales since that time is the opinion of Clyde Van Gorden, sales manager, expressed at a dealers' convention at Minneapolis, Minn., late last month. In the two years, according to Mr. Van Gorden, the Gillette company rose from 39th to 8th place in the domestic tire industry.

Under the new policy, dealers are bonded and receive merchandise on a consignment basis. The company pays for all advertising in local papers, farm papers and trade journals as well as for window displays and direct mail. Dealers are paid a stipulated commission on sales.

According to officials of the company, the additional investment required under the new plan is less than "accounts receivable" formerly were, dealers' commissions on sales are higher, prices to the consumer are lower and sales have more than tripled. A check on the mortality rate among dealers showed that it was less than one-half of 1 per cent.

The new advertising program for the Northwest was presented at the dealers' convention by Willard D. Farnham, of the Cramer-Krasselt Company, Milwaukee, Wis. Full page advertisements are to be used in metropolitan Sunday newspapers, and there will be an increased appropriation for farm papers and community newspapers.

SALES INCREASE SHOWN BY THERMOID COMPANY

The Thermoid Company reports that business showed a marked improvement during the second quarter of the year, with sales for April alone totalling 45 per cent of the sales for the entire first quarter. The company has added 90 new dealers for the handling of Thermoid brake lining during the past six months.

The Southern Asbestos Company, subsidiary of Thermoid, reports their volume of business in March 54 per cent ahead of March, 1930, the total volume for the first quarter showing an increase of 26 per cent over that of a year ago. The Woven Steel Hose & Rubber Company, another subsidiary, reports an increase of 115 per cent in dollar sales for March, 1931, as compared with March, 1930, and heavy gains during the second quarter.

Ask Higher Footwear Duty

The Rubber Manufacturers Association has filed an applications with the Tariff Commission for an increase in the duty on rubber footwear, according to the commission. The petition asks for tariff increases on canvas rubber-soled footwear and on waterproof footwear.

U. S. Rubber Leases Building

The Cross & Brown Company last month leased the five-story building, 100x100.5, at 240-246 West 60th Street, New York City, to the United States Rubber Company. The structure will be used for warehouse and office space.

New Dow Chemical Directors

At the annual meeting of stockholders of the Dow Chemical Company late last month, E. O. Barstow and C. J. Strosacker were elected directors, succeeding the late Dr. Herbert H. Dow and Mrs. Herbert H. Dow, resigned. Other directors were re-elected, as were last year's officers. E. W. Bennett was elected an additional vice-president.

Michelin Equipment Offered

All the rubber machinery and equipment of the Michelin Tire Company plant at Milltown, N. J., has now been cataloged and is being offered for sale. Among the equipment on hand are over 70 mills, sheeters, crackers and washers; complete mold room machinery including about 80 De Mattia and India chucks; curing room and building department equipment; spreading room, benzine house and calender room machinery; tube making, mixing, laboratory, shipping, etc., equipment. Complete catalog and other information is available by writing direct to the factory.

REPUBLIC RUBBER GETS BIG INDUSTRIAL ORDER

Officials of the Republic Rubber Company, Youngstown, O., subsidiary of the Lee Rubber & Tire Corporation, announced late last month that they had received a large order for belting and vacuum hose which will maintain the company's factory at its present capacity for three or four weeks. The plant is now working at between 70 and 75 per cent of total capacity.

Officials said that the new contract would help to take the place of automobile orders, which have fallen off lately. The new order includes 36 large conveyor belts.

NORWALK SELLING PLAN INCREASES TIRE SALES

The Norwalk Tire & Rubber Company, Norwalk, Conn., reporting increased business, credits the upturn to the inauguration of a new selling policy. In the third week of June the company sold more tires and tubes than it has sold during any other single week for six years.

Under its new policy, the company sells direct to members of an association of Norwalk dealers instead of distributing its products through warehouses, salesmen or other middlemen. Company officials estimate that nearly $600,000 a year is saved by the direct distribution plan.

The factory at Winnipauk, Conn., has experienced a general pickup in business for the last several months and now is operating 24 hours a day six days a week and two Sundays a month.

ARLINGTON ON 24-HOUR BASIS AS SALES TRIPLE

The Arlington Rubber Company, manufacturer of golf balls at Dorchester, Mass., has been operating on a 24-hour day schedule since last October. The company's sales have more than tripled as compared to the same period last year, according to F. W. Bommer, president.

While the business of the Arlington Rubber Company is principally in the manufacture of private brand golf balls, the company early this year introduced a new 50-cent ball of its own under the name of the Champion and this has met with marked success. The company uses very small centers in its golf balls and, therefore, uses more rubber thread, giving its balls maximum distance and superior putting control. It has a special patented thread making process, and it was the first company to develop a machine for branding balls automatically.

The Arlington Rubber Company also refines balata and sells wound golf ball centers to other golf ball manufacturers.

Murray Denies Master Merger

The Murray Rubber Company, Trenton, N. J., through Alfred H. Branham, vice-president and general manager, has denied that there is any foundation for Akron newspaper reports to the effect that it is to be absorbed by the Master Tire & Rubber Company. Mr. Branham reports that the Murray company is finding business and profits on the upward trend.

GILMER SUING DAYTON FOR $250,000 DAMAGES

Suit for $250,000 was brought in federal court on June 20 by the L. H. Gilmer Company, Philadelphia, Pa., against the Dayton Rubber Manufacturing Company, Dayton, O. The Gilmer company charges the Dayton firm with unlawful intimidation of customers in regard to certain transmission belts and with circulating reports that the belts made by the Gilmer firm infringed upon patents held by the Dayton company.

Toulmin and Toulmin, attorneys for the Dayton rubber firm, issued a statement denying the allegations and characterizing them as unfounded. No reports concerning the Gilmer products were ever issued by the Dayton Rubber Manufacturing Company, according to its counsel.

Two months ago the Dayton rubber firm filed suit in federal court at Cincinnati against the Gilmer Company and also against the Cincinnati Belting Company for infringement of a patent on belts.

NATIONAL BALLOON RACE FROM AKRON ON JULY 18

The 1931 national balloon race will be started at Municipal Airport, Akron, O., on Saturday, July 18. The National Aeronautic Association last month accepted the invitation of the city of Akron, which was tendered through J. B. Huber, chairman of the aeronautics committee of the Akron Chamber of Commerce.

The national balloon race is run for the Paul W. Litchfield Cup, and the winner becomes an American entrant in the international race which is conducted later in the year. Ward T. Van Orman, of the Goodyear Tire & Rubber Company, won the international race in 1928 and is automatically qualified for this year's contest. He will not, therefore, compete in the national races.

No Accidents at Hewitt

The Hewitt-Gutta Percha Rubber Company, Buffalo, N. Y., completed its second year without a lost-time accident in May, having operated approximately 1,502,000 man-hours. The factory is now well started on its third no-accident year and its employes are unanimous in their expectation of achieving this new record, according to E. K. Twombly, factory manager.

R. R. Olin Technical Bulletins

The R. R. Olin Laboratories, Akron, O., have just initiated a new service to the rubber manufacturing trade in the form of occasional post card bulletins embodying items of technical information which may be of interest and value. This information covers particularly processing, compounding and testing methods in practically every line of rubber manufacture and is the result of more than 20 years of association with that industry. These "Technograms," as they are to be known, will be sent out on perforated cards that may be filled either in a loose-leaf note book or in a standard card file.

Humphrey O'Sullivan

Humphrey O'Sullivan, inventor of the O'Sullivan rubber heel, died at his home in Lowell, Mass., on June 22 after a brief illness. Mr. O'Sullivan, who was 77 years old, had undergone an operation a year ago and never fully recovered his strength.

Born in Skibereen, County Cork, Ireland, October 7, 1853, the third son of Timothy and Catherine O'Sullivan, he served an apprenticeship as a printer and went to New York in 1874. After following his trade for some three years, he joined his brother, the late James O'Sullivan, in a partnership in the retail shoe business. Of an observing nature, he soon found an avenue of expression in the new business. The constant jar of leather heels on concrete pavements which were then becoming common aroused his interest and he set to work to perfect an artificial cushion.

The result was the rubber heel invented in the little store where he and his brother were carrying on business on an original capital of $1,800. The invention was patented under Humphrey's name and the O'Sullivan Rubber Company was incorporated on August 28, 1899, for the manufacture of O'Sullivan's rubber heels. A good share of the early profits from the rubber heels were used to buy space in newspapers and periodicals all over the country, and this campaign eventually became one of the greatest in modern merchandising. In 1911, the enterprise was purchased by the J. P. Morgan interests, and it is now carried on under the name of the O'Sullivan Rubber Company, Inc.

Mr. O'Sullivan was a staunch Democrat and a frequent delegate to national conventions of his party. In 1925 he was made a Knight of St. Gregory by Pope Benedict for his work in Catholic charitable organizations. James O'Sullivan, his brother and partner, died at Lowell on June 21, 1929.

Walter K. Means

Walter K. Means, who was associated with the B. F. Goodrich Company for 20 years, died June 28 at his home in Akron, O. He was 67 years of age.

A native of Akron, Mr. Means in 1903 went to the Goodrich company as a private secretary to various company officials, including E. C. Shaw, who then was superintendent of the company. He retired from active service in 1923 because of declining health. He leaves his widow, three daughters, a sister and a brother, William A. Means, vice-president of the B. F. Goodrich Company.

Abel M. Hamblet

Abel Martin Hamblet, chief chemist of the Goodyear Tire & Rubber Company until a few years ago, died last month at New York City. He was 50 years old.

A graduate of Massachusetts Institute of Technology, he joined Goodyear in 1922. He leaves his widow and three children.

The Firestone Tire & Rubber Company directors have declared the third quarterly common stock dividend for the current fiscal year. It is the regular 25 cents a share dividend and is payable July 20 to all stockholders of record July 3.

FISK RUBBER SECURES LOWER TAX ASSESSMENT

The board of assessors of Chicopee Falls, Mass., have agreed to reduce the assessed valuation of the Fisk Rubber Company by the amount of practically $1,500,000 and just what assessment will be made for this year has not been determined, it is reported. Acceptance of this plan depends upon the approval of the receivers for the Fisk Rubber Company.

Company officials with Attorney Whitfield Reid will confer with Roland W. Boyden, co-receiver with Charles S. Dana. The Fisk Rubber Company is now assessed for $3,943,300, of which $57,000 represents land value on property held in the vicinity of the plant and on the northwest side of the Chicopee River.

Dayton Holds "Open House"

The Dayton Rubber Manufacturing Company, Dayton, O., acted as hosts to thousands of residents of that city and of the Miami Valley on July 7, 8 and 9, when it held "open house" at its tire and mechanical goods factory. An invitation to the public to visit the plant, which was operated at full capacity between 7 and 9 o'clock on each of the three evenings, was extended by J. A. MacMillan, president and general manager.

RUBBER SHARES REFLECT IMPROVED MARKET TONE

Shares of the leading rubber manufacturing companies ended the fortnight registering slight gains in most instances and generally reflected the improvement in the various securities markets. Both the common and preferred issues of U. S. Rubber showed appreciable gains. Goodyear also advanced, while Firestone marked time and did not recede from the improved position noted last fortnight.

Closing prices of the stocks of the principal companies in the industry on July 3, compared with the close on June 19 and to the high and low thus far reached in 1931, are shown in the following table:

	Last Price		—1931—	
	July 3	June 19	High	Low
Aetna	3½	—	5	2
Ajax	—	—	½	¼
American Hard Rubber	—	—	35¼	30
Dayton "A"	—	—	—	—
Faultless	35½	—	37	35
Firestone	171½	183¾	211½	13
do. 6% pfd.	60⅓	60½	63⅝	56¼
Fisk	⅝	⅝	⅞	⅝
do. 1st pfd.	—	1½	3	1
General	—	—	140	80
do. pfd.	—	—	87½	83
Goodrich	14	10¼	20⅞	8¼
do. pfd.	49	—	68	35
Goodyear	42	33	52¾	30⅝
do. 1st pfd.	82	—	91	71
India	11	—	13½	8⅝
Intercontinental	2⅜	—	4½	1⅜
Kelly-Springfield	2	1⅝	3½	1⅜
do. 6% pfd.	—	—	45	35
Lee	3½	—	4¾	2¼
Mohawk	3⅝	4⅛	8	3
do. pfd.	21	—	35	25
Norwalk	1	—	1½	½
Pirelli	33⅝	29½	39¾	28¼
Raybestos-Manhattan	22	—	29½	17½
Seiberling	9	—	10½	4⅝
do. pfd.	50	—	50	32
U. S. Rubber	16	11⅜	20⅜	10¼
do. pfd.	27	22½	36⅛	17

NATIONAL STANDARD CO. SHOWS LARGER PROFITS

The National Standard Company has reported for the eight months ended May 31, 1931, a net profit of $425,811 as compared to earnings of $356,979 in the corresponding period a year ago. The net profit for May showed probably the best monthly increase over a year ago. In that month the company earned $100,797 as against $73,971 in May, 1930.

The National Standard Company manufactures the cables, braids and tapes used in straight-side tire beads and sells them to 95 per cent of the important tire producers, including all the larger companies with the exception of Firestone. National Standard products are used on all tires manufactured for and sold by Sears, Roebuck & Company and Montgomery Ward & Company. In addition the company makes jacks, cranes and other automotive equipment, but its higher profits are reported to be due principally to the increase in automobile tire production.

ATLAS SUPPLY COMPANY MOVES TO NEWARK, N. J.

The Atlas Supply Company, Inc., an affiliate of the Standard Oil Company of New Jersey supplying Atlas tires and other automobile accessories marketed at Standard Oil service stations, will establish its headquarters at Newark, N. J., where the company's main executive and distributing offices for the United States will be located. A long-term lease has been taken in the National Newark Building, and the company's former headquarters in the Graybar Building, New York City, will be given up.

The Atlas Supply Company was organized a year ago to act as a holding company for trade-marks, molds, etc., and to serve as a distributing organization for private brand tires and tubes sold through the service stations of the Standard Oil companies of New Jersey, California, Indiana, Ohio and Kentucky and their subsidiaries and retailers. It was estimated early this year that its Atlas tires would be retailed through 90,000 outlets from coast to coast. The tires and tubes are being manufactured by the United States Rubber Company and the B. F. Goodrich Company.

Well for Deep Rock Oil

The Deep Rock Oil Corporation has completed No. 1 Beulah Jones well in Gladewater area, East Texas, brought in with an estimated initial production of 30,000 barrels a day. This is the first well Deep Rock has drilled in a 60-acre tract owned by the company in the Gladewater area. The Deep Rock Oil Corporation makes solvent for use in the rubber industry.

Manhattan Advertising Agency

The Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., Passaic, N. J., has appointed Roland G. E. Ullman, Philadelphia, Pa., as its advertising agency. Industrial papers and direct mail will be used to advertise the company's products.

New Rubber Goods

New Diamond Rubber Products

The Diamond Rubber Company, Inc., Akron, O., a subsidiary of the B. F. Goodrich Company, has recently introduced a new car-washing hose, rubber matting for safety insulation for operatives of power switchboards, new asbestos sheet packing, intended especially for use with hot oil, and a new belt dressing for rubber belts.

The hose combines plies of wrapped fabric and an outer seamless ply of forty-eight strong, twisted cords horizontally braided, with a newly developed rubber compound having both high resistance to heat and oil and an unusual toughness. This is a noteworthy feature, for rubber that will resist heat and oil usually has but litle tensile strength. More than 1,300 pounds pressure is required to burst it, it is claimed.

The new matting, in ¼-in. thickness, is guaranteed to withstand 15,000 volts under the voltage test and 40,000 volts under the diaelectric test prescribed by the A. S. T. M., it is stated. It has six laminations of rubber and a ply of fabric.

The asbestos sheet packing requires a pressure of 40,000 to 45,000 pounds to make it fail, and immersion tests in kerosene show it superior to the best packings previously developed for this service, it is claimed.

The belt dressing, in stick form, for rubber belts contains no oil or grease, no chemical harmful to belt or pulley and is not inflammable, the manufacturer states.

U. S. Tubes Use Eger Valve

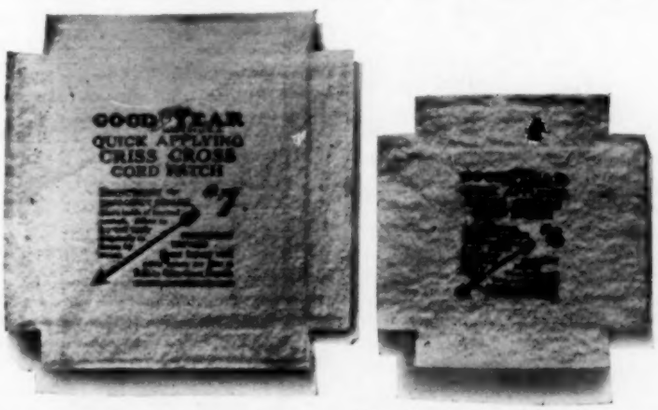
U. S. heavy duty tubes are now equipped with the inter-changeable Eger type valve, greatly reducing the inventory necessary for a dealer to meet all demands, according to the United States Rubber Company. The tube comes equipped with a spud and is accompanied by whatever standard valve the dealer may specify. If the valve type found on the tube is not the type wanted by a purchaser, it is an easy matter to remove one of the type desired from another tube and substitute it, or the dealer may carry a variety of valve styles. This means that the dealer may carry only a reasonable stock of tube sizes, with a separate stock of interchangeable stems.

Gates Wash Rack Apron

This apron is designed by its manufacturers, the Gates Rubber Company, Denver, Col., for car washers and men working in creameries and all similar jobs where a thoroughly waterproof protective apron is required. Unlike the ordinary light fabric rubberized aprons, the Gates wash rack apron is made sturdily of maguire cloth em-

bedded in pure gum rubber. The eyelets are reinforced, absolutely preventing the strings from tearing out the apron material. The edges are turned back and the double thickness, sealed with pure gum rubber cement, protects the apron from being ripped. The wash rack apron is 45 inches long and 35½ inches wide so that it completely protects the workman when handling liquids, and keeps his clothing dry.

Goodyear Quick Applying Criss-Cross Patch



This patch is a best seller in the Goodyear Tire & Rubber Company accessory line

Names in the News

CURTIS J. DETWILLER has joined the personnel department of the Firestone Tire & Rubber Company. He was recently graduated from Mount Union College.

GEORGE OENSLAGER, research chemist of the B. F. Goodrich Company, spoke on "Developments in Rubber Technology" at the University of Michigan, Ann Arbor, Mich., on July 2 in connection with the summer school of the Society for the Promotion of Engineering Education.

HARVEY S. FIRESTONE, president of the Firestone Tire & Rubber Company, was presented with the Spencerian Scroll of Distinction at the Spencerian School commencement exercises at Cleveland, O., on June 24. The scroll, which is awarded to Spencerian graduates in recognition of outstanding achievements in business, is the second of its kind to be presented, the first having been given two years ago to John D. Rockefeller.

W. E. POWELL, assistant sales manager of the drug sundries division of the B. F. Goodrich Company, was one of the speakers June 17 at the 54th annual convention of the Kentucky Pharmaceutical Association at Crab Orchard Springs, Ky. His topic was "Drug Merchandising." On June 24, Mr. Powell spoke before the state meeting of Michigan pharmacists at Grand Rapids, Mich.

ALLARD SMITH, executive vice-president of the Union Trust Company, Cleveland, O., addressed the members of the Akron Real Estate Board on June 22 on "Getting Back to Better Business." In the course of his talk, he pointed out that millions of tires and tubes are ready for replacement and, therefore, the tire industry is bound to pick up, which will mean better business for every type of industry in the Akron district.

RUSSELL L. COLLEY, engineer of the B. F. Goodrich Company, spoke on June 23 before the members of the Rotary Club of Wadsworth, O., on his company's new ice removing device for airplane wings.

A. H. MAUDE has been transferred from the Rubber Service Laboratories Company, Nitro, W. Va., to the East St. Louis plant of the Monsanto Chemical Works, where he will continue his work in chemical engineering and research.

HUGH E. SYMONS and J. P. RIPLEY, who for a number of years were prominent in the sales organization of the Fisk Rubber Company, Chicopee Falls, Mass., have both rejoined that company to engage in sales work. Mr. Symons, who for 20 years was district manager for Fisk at Detroit, Mich., has been appointed to the position of zone manager of the Detroit zone. Mr. Ripley, who was district manager for Fisk in New York, has been appointed to a post on the general sales manager's staff.

HARVEY WILLSON JOINS CRUDE OIL ASSOCIATION

Harvey Willson, for three years general manager of *Tire and Auto Accessory Topics* and prior to that assistant general manager of the Rubber Manufacturers Association, has become associated with the executive staff of the Pennsylvania Grade Crude Oil Association at Oil City, Pa. This body is an organization of producers, refiners and jobbers of Pennsylvania grade crude oil and has a total membership of about 1,300.

Mr. Willson's first experience was gained between 1912 and 1917 with the Trunk Line Association, a co-operative organization of

HARVEY WILLSON

eastern railroads. He served in the Marine Corps during the World War and in the nine years from 1919 to 1928 acted as assistant general manager of the Rubber Manufacturers Association. In 1928, Mr. Willson resigned from that organization to engage in the publishing of *Tire Topics*, a trade journal for tire dealers, which was purchased two months ago by Federated Business Publications and merged with *Tires*.

S. R. COLUCCI, northwestern representative for the Republic Rubber Company, located in Seattle, Wash., spent the last two weeks of June at the company's home office in Youngstown, O. This is the first trip to his company headquarters and his own former home that Mr. Colucci has made since going to the northwest two years ago.

FRED GRAS, of the mechanical goods design department of the Goodyear Tire & Rubber Company, completed 30 years of service with that organization on June 25. Before coming to Goodyear, he had nine years of experience with the New York Belting & Packing Company.

KENNETH B. COOK, technical manager of the Manville Jenckes Company, Pawtucket, R. I., was elected a member of the executive committee of the American Society for Testing Materials at the annual meeting held last month at Chicago, Ill. After his graduation from Lowell Textile Institute in 1913, Mr. Cook acted for three years as designer and assistant superintendent of the American Mills Company, Waterbury, Conn. During 1916 he was assistant in charge of the textile department of the United States Rubber Company general laboratories. In 1917 he organized and was made manager of the textile section of that company. During 1927 he was technical superintendent in charge of quality at the Winnsboro Cotton Mills of the United States Rubber Company at Winnsboro, S. C. From 1928 until the present time, Mr. Cook has been technical manager of Manville Jenckes and later general manager of the southern mills of that company. He has long been active in the work of Committee D-13 of Textile Materials.

WILLIAM R. DOLTON, superintendent of the Murray Rubber Company, Trenton, N. J., and his family are at their summer home at Bay Head, N. J.

FELIX P. DONNELLY, of the Goodyear Rubber Plantations Company, and Mrs. Donnelly returned to the United States early this month after three years on the Goodyear plantations near Singapore. After a few months at their home in Brooklyn, N. Y., they will return to the Far East.

D. FISHER BROWN was appointed manager of the bicycle and automotive branch of the Continental Rubber Works at New York City, his appointment taking effect on July 1. On the same date, B. J. SMITH was appointed mechanical sales manager in charge of that department at the factory, Erie, Pa. Mr. Smith has been with the company for the past ten years in charge of the branch at St. Louis, Mo.

ALAN SINCLAIR, son of Sir Walrond Sinclair, manager of the British Goodrich Company, arrived in Akron on June 25 to study American manufacturing processes. Mr. Sinclair will go from the Akron factories of the B. F. Goodrich Company to the Hood Rubber Company, Goodrich subsidiary at Watertown, Mass., before returning to England.

C. W. SEIBERLING, vice-president and treasurer of the Seiberling Rubber Company, flew from Akron to Pittsburgh on June 25 and returned home the same day after spending several hours with friends and business representatives. While at Pittsburgh, he stated his opposition to wage cuts in newspaper interviews. "I do not believe in lessening the purchasing power of labor by cutting wages," Mr. Seiberling said, "for it creates a lack of confidence which soon makes itself felt in many ways."

Rubber News Around the World

RUSSIA SAID TO HAVE MADE RUBBER FROM OIL

Great secrecy is being maintained in Russia concerning the reported discovery of a method of manufacturing rubber from oil on a commercial scale.

The report first appeared as a short item in "Izvestia," the official organ of the Soviet Government.

It was announced that half a ton of this rubber had been produced, and that it had been sent to the Red Triangle rubber factory for manufacture into various articles.

But attempts to obtain further information regarding the process have been systematically frustrated, reports the Moscow correspondent of the British United Press. The Scientific Institute for Rubber Research explained that the invention was a State secret, and intimated that the item in "Izvestia" had appeared "by accident."

Another report stating that rubber had been manufactured from oil appeared in the "Krasnaye Gazette." This report was in the form of a telegram announcing the fact from the engineers and technical staff of the Red Triangle factory.

Requests for information regarding the process were refused from all quarters, but the editor of a popular scientific magazine, "I Wish to Know Everything" ("Khochoo Vsyo Znat"), declared that an article explaining the process had been received six months before, but was suppressed just before publication.

A Soviet chemist of high standing, however, agreed to explain the general principle of the process. He said:

"Oil and rubber are both hydro-carbons. Every atom of carbon is able to absorb no more than four units of hydrogen. A saturated hydro-carbon is one that cannot absorb any more hydrogen.

"Rubber produced from oil is a highly complex compound of saturated and non-saturated hydro-carbons. Liquid hydro-carbons, like oil, when subjected to pressure by means of heat, acids, or alkalis, will produce a compound that has all the properties of rubber. It is all a question of condensation of liquid hydro-carbons."

At the time that the first undetailed reports of the Soviet experiments were published, Thomas A. Edison characterized them as unlikely. "I don't think the Moscow report is true," he commented. "I don't believe one can get good rubber from oil. I would even go so far as to say oil rubber is a fake.

"The Russians, to my knowledge, are working on extraction of rubber from the guayule plant, which is now being grown successfully in the United States. I think they also are working on other plants but they had better stick to the guayule because it is the best rubber producer outside the tropics."

A specimen of synthetic rubber made from butadiene, separated from cracked gasoline, was exhibited at the Chemical Industries Exposition at New York in May.

Ebonite for Filtration

The production of porous ebonite for use as a filtration material was described recently in a paper by E. Vossen, of Cologne, Germany. The paper was presented at the annual meeting of the Deutsche Gesellschaft fur Chemisches Apparatewesen E. V., held in Vienna.

May Golf Ball Imports Gain

Imports of golf balls during May, 1931, numbered 230,124, valued at $69,779, the largest total since June, 1930. These imports compare with April imports of 153,709 balls, worth $47,722. The unit value per ball in May was 30.3 cents as against 31.0 cents in April and 31.2 cents in March.

MOSCOW RUBBER FACTORY ASSISTS ITS EMPLOYES

The Moscow rubber factory "Caoutchouc," which fulfilled its Five-Year Plan in two and a half years, is doing much in improving working conditions for its employes. A statement given to the press by the factory shows its progress to have been as follows: Output in 1924-25—3,450,000 rubles, in 1928-29—13,800,000, in 1930—24,700,000. In 1931 it is expected to reach 34,400,000 rubles, and in 1932 over 60,000,000 rubles. Ninety-five per cent (2,300 workers) of all the workers and employees are enrolled in shock brigades.

The working day is 7 hours and for those engaged in occupations injurious to health, 6 hours. The departments have one of the best systems of ventilation, and safety and health regulations are strictly observed. One hour is given for lunch, which may be had in the factory dining room or at the department lunch counters.

The day of rest after each 4 days of work may be spent in the recently-built club-house for 1,500 persons, in the gymnasium, in the theaters, library or schools. Every worker gets a 3- or 4-week vacation each year.

The new workers hired are placed in newly-built houses, the construction of which is financed out of the funds for the improvement of the standard of living of the workers and those of the housing cooperative. In place of the old congested wooden shacks there have now been built in the vicinity of the factory 38 5-story houses with comfortable apartments.

The children are brought up and educated in the factory day-nursery which accommodates 150 children; in kindergartens for 200 children, in the 7-year elementary school for 2,000, and in the trade school for 700 pupils.

The average monthly wage has increased four-fold as compared with 1916, amounting to 144 rubles as against 37 rubles.

The Leningrad Geo-Chemical Institute has discovered new uses in the rubber industry for the by-products of nepheline. It has been found that it can be used successfully as a filler in the manufacture of rubber articles.

JAPANESE EXPORTS OF RUBBER FOOTWEAR GAIN

The production of rubber boots and shoes in Japan has been increasing rapidly in recent years. The extent of this increase over the seven-year period 1922-29 is shown by a comparison of production figures for the last and first years of this period: $14,398,670 and $1,966,130 respectively. It is estimated that rubber-soled shoes constitute 70 per cent of the total yearly values.

In 1930 exports of rubber boots and shoes amounted to 1,422,565 dozen pairs valued at $3,296,334, as compared with 1,159,048 dozen pairs valued at $3,722,273 in 1929, and 446,630 dozen pairs valued at $1,941,824 in 1928. According to the latest available (1928) statistics showing the destinations of these exports, the following countries provided the principal markets: China, 228,082 dozen pairs ($1,168,000); Hongkong, 91,173 ($363,000); Kwantung Province, 25,506 ($116,000); Dutch India, 41,656 ($115,000); and British India, 37,336 dozen pairs ($68,000).

The prices of rubber-soled canvas shoes have been falling during the last few years. The following minimum prices per dozen pairs for United States sizes are fixed by the Hyogo-ken Rubber Manufacturers Association, effective on and after May 1, 1931, and are those to be quoted to exporters in Kobe: 1st grade, 9-11, $2.65; 2nd grade, 4-11, $2.40; 1st grade, 4-9, $2.25; 2nd grade, 11-3, $1.75; children, 4-10, $1.35.

Unlined canvas shoes are about 6.5 per cent less, while crêpe-soled shoes are about 50 cents per dozen higher in price than the white-soled shoes.

NORTH BRITISH RUBBER HAS LOSS OF $256,400

The North British Rubber Company, Ltd., second largest rubber manufacturer in Great Britain, has reported for the year of 1930 a trading loss of £52,717, or approximately $256,400. This compares with a trading profit in 1929 of £94,082, or about $457,700.

To the 1930 trading loss is added depreciation, interest, and £68,000 provided to write down raw materials and purchase commitments, and the dividend for the first half-year on the preference shares, making a total deficit of £174,050. The directors have transferred £170,000 from reserve and £23,103 remains to go forward, against £27,153 brought in.

The question of a further payment on the preference shares has been deferred until later in the year.

Move Calmon Footwear Plant

Calmon's Asbestwerke has recently transferred the manufacture of gymnastic sports shoes and galoshes to the rubber factory at 36 Flotowstrasse, Hamburg, Germany. Automobile tires were formerly manufactured at that plant.

Current Crude Rubber Items

RESTRICTION SUGGESTED BY MALAYAN COMMITTEE

The General Purposes Committee of the Federated Malay States, comprising unofficial citizens, both European and Asiatic, representative of various public bodies, has submitted a memorandum to the Government, with a request for it to be forwarded to the Secretary of State. The memorandum states that it is the considered opinion of the committee:

First—The control of rubber production is desirable provided that all the principal producing countries are prepared to participate.

Second—That any international scheme for control should provide for protection against the accumulation of heavy stocks in producing countries.

Third—That it is desirable international agreement should be reached that for a period of years no further areas shall be alienated for rubber cultivation.

Fourth—That control should have for its sole object the keeping of unwanted rubber off the market, and not of forcing up prices beyond an economic figure.

Fifth—That if other principal producing countries are not prepared to participate, Malaya, while anticipating a number of lean years for all producers, should not consider control in any form.

Sixth—That no appreciable falling away of Malayan production owing to economic pressure can be looked for unless the price of the commodity falls to a lower level than it has reached hitherto, as it is certain that employees of all nationalities will be prepared to accept lower wages in preference to being repatriated.

MAY OUTPUT INCREASED DESPITE LOWER PRICES

Production of rubber on Malayan estates under 100 acres in size, largely "native," increased from 11,925 tons in April to 15,399 tons in May, according to the Far Eastern rubber census.

Production on estates over 100 acres in size also increased, amounting to 18,904 tons in May, compared with 17,039 tons in April.

Considerable attention was paid to this report in the rubber industry in view of the belief that the present record low prices for the commodity would discourage production.

The stock changes for the month were a "stand off." Estate stocks in May totaled 21,901 tons, against 21,406 tons in April, while dealers' holdings amounted to 18,393 tons, against 18,789 tons in April.

Dutch Rubber Exports Up

Shipments of rubber by the Dutch East Indies during May totaled 25,530 tons, compared with 21,637 tons exported during April, and with 25,329 tons during May last year. All sections, native as well as European estate, reported larger exports for May as compared with the previous month.

Exchange Differentials

The adjustment committee of the Rubber Exchange of New York on June 25 fixed the price differentials between the various grades of Hevea plantation rubber which shall prevail on all deliveries against the new "A" contracts for the month of July as follows: No. 2 crepe (thick or thin) at 10 points; No. 2 ribbed smoked sheets at 12 points; No. 3 ribbed smoked sheets at 28 points; No. 4 ribbed smoked sheets at 43 points; No. 5 ribbed smoked sheets at 68 points; limit of allowance on No. 2 crepe at 25 points; allowance on rubber delivered in bales at 13 points.

MORE RUBBER SHIPPED TO AMERICA DURING MAY

Of the total of 44,281 tons exported by Malaya in May, 31,014 tons were destined for United States ports, as compared with 29,021 tons shipped to this country in April, and 33,010 tons during May, 1930, the Rubber Exchange of New York was informed.

Smaller quantities were exported during the month to the United Kingdom and to Japan; larger totals were reported to all other countries. Malaya also imports rubber from other territories, chiefly Dutch colonial, for trans-shipment. Such imports amounted to 10,479 tons during May, compared with 9,977 tons in April.

Rubber Exchange May Join Market Consolidation Plan

SUPPORTERS of a proposal to consolidate New York's commodity exchanges under one roof are apparently nearer to their goal than ever before, with the heads of several of the leading exchanges signifying approval of the plan. The plan proposed would house in the Produce Exchange Building, either in the present large structure at Broadway, Beaver and Whitehall Streets, or in the proposed new building to be erected on that site the following exchanges: rubber, grain, sugar and coffee, cottonseed oil, raw silk, metals, hides and cocoa.

J. L. Julian, president of the Rubber Exchange of New York, said: "It should be done by all means; it would be a tremendous saving to brokers and would instantly create a very sharp enhancement in the price of composite seats. It would also increase the breadth of volume of trading of each market."

H. L. Bodman, president of the Produce Exchange, stated that such a step would lower costs of operation for all of the exchanges concerned, and thought that officials of the various organizations "approved of the matter in principle."

"There is no question," he said, "but what from many points of view the grouping of the various commodity exchanges in one vicinity would facilitate and cheapen the cost of operation of the exchange organizations themselves, the clearing houses incidental to them, and the firms operating through them.

"As the various elements now own property or hold leases on the properties where they are at present domiciled, it would take a very considerable amount of negotiation and the adjustment of some real differences to accomplish any such arrangement.

"So far as I have been able to ascertain, several officers of the various organizations approve of the matter in principle, but are loathe to undertake the immense amount of personal labor involved without clear indications from their members of a very real desire on the part of the members to accomplish such grouping or consolidation.

"The officers of the commodity exchanges serve without pay; they attempt, often vainly, to find time to operate their own businesses while acting for their trade organizations and naturally do not care to assume extra burdens without being sure their memberships are in accord with their endeavors.

"On the other hand, once such an assurance is given by the memberships on their own initiative, the same officers would be ready to do their best to accomplish the results desired."

The suggestion of a central clearing organization was held practical. Three of the commodity exchanges recently merged their clearing associations into one organization, and it was learned that the costs of operating it are less than half of the combined costs prior to amalgamation.

Clearing associations are vitally important to the operation of a commodity exchange on a basis of safety. Clearing members are required to become "stockholders" in the organization and post as much as $10,000 before they are admitted, in addition to daily deposits to cover any indebtedness in balances growing out of their dealings in commodity futures. The initial amount varies; in the case of grain and cottonseed oil, the amount runs as low as $3,000 and $2,000 for the member.

Those who favor the unification project with the Produce Exchange pointed out that these sums would be cut down considerably under such a plan. Thus, a commission house handling trading accounts for its customers in either sugar, rubber, grain or silk, could for one membership fee, of say $5,000, clear contracts in any or all of these commodities.

A number of well-known commission houses who hold membership on all stock and commodity exchanges would therefore find it less burdensome during dull and trying periods in some commodities, to belong to all of them under the unified plan, it was said.

GOODRICH TIRE SALESMEN HAVE AKRON CONFERENCE

Truck and bus salesmen of the B. F. Goodrich Company from all parts of the country attended a special sales conference at the company's Akron headquarters from June 22 to 25. Talks on products, sales, costs and advertising featured the session, and the new Goodrich "zero pressure" cushion tire was discussed in detail.

The speakers at the conference included P. E. Tobin, sales personnel; W. C. Bray, truck and bus tire sales manager; T. A. Aspell, manager, manufacturers' sales; W. C. Behoteguy, merchandising manager; E. H. Barder, superintendent tire division; H. W. Delzell, development engineer; C. W. Bedford, tire process engineer; C. E. Snyder, development engineer; W. H. Elliott, development engineer; H. H. Wagner, development engineer; K. D. Smith, manager tire development department; C. R. Mason, manager adjusting department; C. H. Russell, national accounts; E. Tomlinson, truck and bus tires; P. J. Kelly, advertising manager; Guy Gundaker, sales promotion manager; J. T. Staker, truck and bus sales; O. J. Sullivan, national accounts; and C. B. O'Connor, general sales manager, tire division.

COMPANIES AT THE HAGUE FORM NEW ASSOCIATION

Approximately 20 rubber companies domiciled at The Hague have decided to form a rubber association of The Hague. The object is to discuss rubber interests, and, so far as possible, to act jointly in regard to proposals made by other rubber committees.

Rubber companies domiciled at The Hague represent an annual production of about 10,000,000 metric pounds. Jonkheer H. J. van den Bosch, managing director of the Pondok Gedeh Rubber Company, is to act as chairman of the new association.

Ice Remover Patent Suit

One feature of the B. F. Goodrich Company device for the removal of ice from airplane wings is now in litigation before the examiner of patent interferences. This involves the idea of treating the surface exposed to the elements with a substance which reduces adhesion of ice, a scheme with which Raphael C. Gallinant, of Richfield Park, N. J., claims to have experimented for several years. There is no interference, however, with the inflatable overshoe device which is the main basis of the Goodrich invention by William C. Geer and Merritt Scott.

CLINTON E. LITTLE has resigned as president of the Beacon Falls Rubber Shoe Co.

Russia Makes Hydraulic Presses

The "Red Hydropress" mill at Taganrog, in the North Caucasus section of Russia, has begun the manufacture of hydraulic presses of the type widely used in the production of rubber goods. These presses will be produced for the several rubber goods factories in the Soviet Union.

Van Cleef Safety Record

Van Cleef Brothers, Chicago, Ill., manufacturers of rubber insulating tape and other rubber products, closed a period of 814 days with no lost-time accident earlier this year, the record being unfortunately broken by a minor accident. All Van Cleef employes are members of the factory's Safety and Social Club and must attend regular meetings about every 60 days, where such matters as safety, health and general welfare are discussed. Committees on fire prevention, safety, sanitation and welfare are appointed, and interesting programs are arranged for each club meeting.

SCRAP RUBBER EXPORTS GAIN AT HOUSTON, TEXAS

Scrap rubber is moving from Houston, Tex., to Belgium, France, Holland, Italy and Spain in heavy volume and has become a new export feature of that port. Such shipments recorded an increase of 352 per cent over the previous year, according to Ernest L. Tutt, district manager of the United States Department of Commerce.

For the country as a whole, such exports declined about 25 per cent from the 1929 figures.

PAUL SHEEKS is acting as general chairman of the annual outing for employes of Plant One of the Firestone Tire & Rubber Company and the Xylos Rubber Company, which will be held July 11 at Summit Beach Park near Akron. It is expected that more than 15,000 picknickers will participate in the affair.

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LATE MARKET PRICES

RUBBER—COTTONS AND FABRICS—CHEMICALS

NEW YORK, JULY 3, 1931

Crude Rubber

THE crude rubber market during the past fortnight took an upward turn all along the line and reflected the improved conditions in the stock and other commodity markets. Advances of a ½ to ¾ cent were registered in spite of the fact that actual demand for spot continued weak, the chief argument for the higher prices being, of course, the expected international debt agreement.

Prices quoted on the New York outside market at the close of July 3, were as follows:

Plantations—			
Ribbed Smoked Sheets—			
Spot—July	.06¾	@	.06⅞
August-Sept.	.06⅞	@	.07
Oct.-Dec.	.07⅛	@	.07⅛
First Latex, crepe spot	.06⅞	@	.07
Amber Crepe, No. 2	.06⅝	@	.06¾
Amber Crepe, No. 3	.06⅝	@	.06¾
Amber Crepe, No. 4	—	@	.06⅝
Brown Crepe, Clean thin	—	@	.06½
Brown Crepe, specky	—	@	.06⅜
Liquid Latex, per gal.	.70	@	.80
Paras—			
Up-river, fine	.08⅛	@	.08¾
Up-river, coarse	Nominal		
Acre Bolivian, fine	.08¾	@	.09
Caucho Ball, Upper	Nominal		
Centrals—			
Central scrap	.06	@	—
Esmeraldas	.06	@	—
Balata—			
Block, Ciudad	—	@	.30

LONDON MARKET

Standard Ribbed Smoked Sheets—Buyers

Spot July	3 1/4d	@	3 3/8d
August-Sept.	3 3/8d	@	3 1/2d
Oct.-Dec.	3 1/2d	@	3 5/8d

SINGAPORE MARKET

Standard Ribbed Smoked Sheets—Sellers

Spot	—	@	3d

Daily closing prices and sales on the Rubber Exchange of New York follow:

Reclaimed Rubber

Reclaimed rubber prices on several grades were shaved off slightly during the last two weeks but demand is reported to be holding up. Reclaimers are said to be operating at about the same rate as last quarter. Reclaimers are also giving special consideration to the development of special grades for specific purposes. Late prices follow:

High Tensile				
Super-Reclaim Black	lb.	.06¾	@	.07
High Tensile Red	lb.	.06½	@	.06¾
Shoe				
Unwashed	lb.	.05¾	@	.06
Washed	lb.	.07¼	@	.07½
Tube				
No. 1 (Floating)	lb.	.08	@	.08½
No. 2 (Compounded)	lb.	.06½	@	.06¾
Tires				
Black	lb.	.05	@	.05¼
Black, selected tires	lb.	.05¼	@	.05½
Dark Gray	lb.	.06½	@	.06¾
Light Gray	lb.	.07	@	.07¼
White	lb.	.07½	@	.07¾
Truck, Heavy Gravity	lb.	.06	@	.06¼
Truck, Light Gravity	lb.	.06¼	@	.06½
Miscellaneous				
Mechanical blends	lb.	.04½	@	.05

Scrap Rubber

The scrap rubber market slide off during the last fortnight to ranges more in line with prevailing reclaimed prices. The low prices have made accumulations more difficult but the steadiness of the demand from reclaimers is still an encouraging factor in the situation. Late quotations follow:

(Prices to Consumer)

Auto tire peelings	ton	19.00	@	20.00
Mixed auto	ton	9.00	@	9.50
Bicycle tires	ton	5.00	@	6.00
Clean solid truck tires	ton	24.50	@	26.00
Boots and shoes	cwt.	1.00	@	1.10
Arctics, untrimmed	cwt.	.50	@	.62½
Inner tubes, No. 1	lb.	.03¼	@	.04
Inner tubes, No. 2, compounded	lb.	.01⅞	@	.02¼
Inner Tubes, Red	lb.	.01⅝	@	.01¾
Air Brake Hose	ton	9.00	@	10.00
Rubber Hose	ton	8.50	@	9.00

Cotton

COTTON has experienced a slight jump upward in conformity to the markets of other commodities during the last two weeks. Last weeks figures showed another decrease in the world's visible cotton supply and the general tone of the market was distinctly bullish. Stocks of textile goods are low and mills are reported to be buying heavily. At the same time the Cotton Textile Institute is continuing its vigorous campaign for a curtailment of output more in line with demand.

New York Cotton Exchange high, low and closing prices on July 3 follow:

	High	Low	Close	Close
		July 3		June 20
July	10.17	9.95	10.17	8.89
Oct.	10.53	10.34	10.51	9.31
Dec.	10.75	10.58	10.73	9.55

Tire Fabrics

While the raw cotton market showed advances over the fortnight, prices on tire fabrics dropped slightly all along the line in the face of light demand and few inquiries. Late prices follow:

(Prices Net at the Mill)

CORD				
Peeler, carded, 23/4/3	lb.	.26½	@	.27
Peeler, carded, 23/5/3	lb.	.25½	@	.26
Peeler, carded, 13/3/3	lb.	.23½	@	.24
Peeler, carded, 15/3/3	lb.	.24	@	.24½
Egyptian, carded, 23/5/3	lb.	.36	@	.37
Egyptian, combed, 23/5/3	lb.	.40	@	.40½
CHAFERS				
Carded, American, 8 oz.	lb.	.23½	@	.24
Carded, American, 10 oz.	lb.	.23½	@	.24
Carded, American 12 oz.	lb.	.23	@	.23½
Carded, American, 14 oz.	lb.	.21	@	.21½
LENO BREAKER				
Carded, American, 8¼ oz.	lb.	.22	@	.26
Carded, American, 10¼ oz.	lb.	.22	@	.26
SQUARE WOVEN				
Carded, American, 17¼ oz. 23-11 ply	lb.	.26½	@	.27
Carded, American, 17¼ oz. 10-ply	lb.	21	@	.21½

Sheetings

A slight recovery in prices featured the market for sheetings during the last two weeks. The latest quotations for the more popular size follow:

40-inch, 2.50-yard	yd.	.06¾	@	.07
40-inch, 2.85-yard	yd.	.06	@	.06½
40-inch, 3.15-yard	yd.	—	@	.07¼
40-inch, 3.60-yard	yd.	.06	@	.06¼
40-inch, 3.75-yard	yd.	.05	@	.05¼
40-inch, 4.25-yard	yd.	.04½	@	.04¾

Ducks

There was no change in the price levels for ducks during the fortnight and only a moderate amount of scattered demand was reported. Latest quotations follow:

Belting and Hose	lb.	.21¼	@	.23
Enameling	lb.	.19½	@	.20
Single filling	lb.	—	@	.10
Double filling	lb.	.11	@	.11¼

Closing Prices on Rubber Exchange of New York, Inc.

FROM JUNE 22 TO JULY 2, 1931

		Spot	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Sales
No. 1 Standard Contract of 10 Tons															
June	22	6.40	6.40	6.50	6.60	6.68	6.77	6.85	6.91	6.97	7.03	7.13	7.23	——	130
	23	6.25	6.22	6.32	6.42	6.49	6.57	6.65	6.72	6.79	6.86	6.96	7.06	——	102
	24	6.25	6.35	6.45	6.55	6.64	6.73	6.83	6.89	6.96	7.03	7.12	7.21	——	139
	25	6.50	6.50	6.59	6.70	6.78	6.88	6.98	7.04	7.09	7.15	7.25	7.35	——	218
	26	6.70	6.85	6.96	7.07	7.15	7.24	7.32	7.38	7.44	7.50	7.62	7.75	——	259
	27	7.00	7.06	7.16	7.26	7.33	7.39	7.45	7.51	7.58	7.65	7.76	7.88	——	96
	29	6.60	6.65	6.75	6.85	6.93	7.02	7.10	7.16	7.23	7.30	7.39	7.48	——	173
	30	6.90	6.94	6.95	6.96	6.98	7.08	7.16	7.20	7.26	7.30	7.43	7.57	——	142
July	1	6.65	6.63	6.70	6.78	6.85	6.95	7.06	7.13	7.20	7.28	7.38	7.48	7.58	108
	2	6.65	6.65	6.72	6.80	6.90	7.00	7.10	7.17	7.24	7.30	7.40	7.50	7.60	28
Old "A" Contract of 2½ Tons*															
June	22	——	6.30	6.40	6.50	6.60	6.70	6.90	6.89	6.95	7.01	7.11	7.31	——	46
	23	——	6.20	6.30	6.30	6.40	6.50	6.60	6.70	6.77	6.84	6.94	7.04	——	33
	24	——	6.30	6.40	6.50	6.60	6.70	6.80	6.87	6.94	7.01	7.10	7.19	——	20
	25	——	6.40	6.50	6.60	6.70	6.80	6.90	7.02	7.07	7.13	7.23	7.33	——	100
	26	——	6.80	6.90	7.00	7.10	7.20	7.20	7.36	7.42	7.48	7.60	7.73	——	237
	27	——	6.90	7.00	7.10	7.20	7.30	7.40	7.49	7.56	7.63	7.74	7.86	——	16
	29	——	6.50	6.70	6.80	6.80	6.90	7.00	7.14	7.21	7.28	7.37	7.46	——	3
	30	——	6.80	6.80	6.90	6.90	7.00	7.10	7.18	7.24	7.28	7.41	7.55	——	2
July	1	——	6.60	6.60	6.70	6.80	6.90	7.00	7.11	7.18	7.26	7.36	7.46	7.56	2
	2	——	6.40	6.60	6.70	6.80	6.90	7.00	7.15	7.22	7.28	7.38	7.48	7.58	31

Quotations for months after December, 1931, are for New "A" Contract.

CHEMICALS

ALTHOUGH some of the smaller tire companies announced that they would increase production still further during July, there is already a noticeable falling off among certain of the larger producers. Some of the major factories will be closed for inventories of short duration this month, and this fact, together with the intervening holiday, makes it unlikely that July rubber consumption and, therefore, rubber chemical demand will equal that of June.

ACCELERATORS

Organic			
A-1	lb.	.24 @	.27
A-5-10	lb.	.33 @	.36
A-7	lb.	.55 @	.59
A-11	lb.	.62 @	.66
A-16	lb.	.57 @	.61
A-19	lb.	.58 @	.62
A-20	lb.	.64 @	.68
A-32	lb.	.80 @	.95
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.		
Aniline oil, drums, f.o.b. works	lb.	.14½@	.16
Captax	lb		
Cryiene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.42 @	.44½
Diphenylguanidine	lb.	.30 @	.32½
Ethylidene aniline	lb.	.45 @	.47½
Formaldehyde aniline	lb.	.37½@	.40
Heptene	lb.	.40 @	—
Hexamethylene-tetramine	lb.	.58½@	.61
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.37½@	.40
Monex	lb.	3.25 @	--
Oxynone	lb.	.68 @	.80
Phenex	lb.	.75 @	—
Pipsol	lb.	4.30 @	4.50
R & H 40	lb.	.40 @	.42½
R & H 50	lb.	.40 @	.42½
R & H 397	lb.	.75 @	.77½
R-2	lb.	1.95 @	2.15
Safex	lb.	1.20 @	1.25
SPDX	lb.	.75 @	—
Super-Sulphur No. 1	lb.		
No. 2	lb.		
Tensilac, No. 39	lb.	.40 @	.42½
Tensilac, No. 41	lb.	.50 @	.52½
Thermio F	lb.	.50 @	.55
Thiocarbanilid, drums	lb.	.21 @	.23
TMTT	lb.	3.00 @	3.25
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.58 @	.60
Tuads	lb.		
Ureka	lb.	.75 @	1.00
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Z-88-P	lb.	.50 @	.60
Zimate	lb.		
Inorganic			
Lead, sublimed blue	lb.	.08¼@	—
Lead, white	lb.	.08½@	.08¾
Litharge, domestic	lb.	.07¾@	—
Magnesia, calcined, light	per 100 lb.	5.35 @	5.45
heavy	per 100 lb.	3.65 @	3.75

COLORS

Blacks (See Compounding Materials)			
Blues			
Prussian	lb.	.35 @	.36
Ultramarine	lb.	.06 @	.32
Browns			
Sienna, Italian	lb.	.05½@	.12½
Umber, Turkey	lb.	.04½@	.07
Greens			
Chrome, light	lb.	.30 @	.32
medium	lb.	.31 @	.33
dark	lb.	.34 @	.36
Chromium Oxide, bbl.	lb.	.34½@	.35½
Reds			
Antimony crimson, 15/17	lb.	.40 @	.44
sulfur, free	lb.	.56 @	.66
golden, 15/17 F.S.	lb.	.20 @	.25
Indian English	lb.	.08 @	.11
Domestic (Maroon)	lb.	.11 @	—
Oximony	lb.	.13¼@	—
Red oxide, pure	lb.	.10 @	.12
Smith's 444 Crimson f.o.b. Springfield	lb.	.08¾@	.10
Rub-Er-Red, f.o.b.Easton	lb.	.08¾@	—
Venetian red	lb.	.08 @	.06
Vermillion, quicksilver. English	lb.	1.75 @	1.80
Whites			
Lithopone, Akeolith	lb.	.05 3/5@	.06
Lithopone, Albalith	lb.	.05¼@	.05¾
Lithopone, Azolith	lb.	.05¼@	.05¾
Lithopone, Vanolith	lb.	.05¾@	—
Titanium oxide	lb.	.21 @	—
Titanox B, f.o.b. St. Louis,	lb.	.06½@	.07
Titanox C, f.o.b. St. Louis,	lb.	.07 @	.07½
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06½@	.07
ZZ (leaded)	lb.	.06⅝@	.06⅞
Horsehead Brand:			
Special	lb.	.07 @	.07½
XX Green	lb.	.07 @	.07½
XX Red, lead free	lb.	.06½@	.07
Kadox, black label	lb.	.10⅝@	.10⅞
blue label	lb.	.09⅝@	.09⅞
red label	lb.	.08 @	.08½
St. Joe, black label	lb.	.06½@	.07
red label	lb.	.06½@	.07
Zinc Oxide—French Process			
Anaconda, lead free	lb.	.06½@	.07
Anaconda, selected lead free	lb.	.07 @	.07½
White seal	lb.	.11⅝@	.11⅞
Green seal	lb.	.10⅝@	.10⅞
Red seal	lb.	.09⅝@	.09⅞
Yellows			
Chrome	lb.	.16½@	.17
Ocher, French medium	lb.	.02 @	.03
domestic	lb.	.01⅝@	.02

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85 @	24.50
Ammonia carbonate, lump	lb.	.10½@	.12
Asbestine	ton	14.75 @	16.00
Barium carbonate	lb.	.03½@	.05
Barium Dust	lb.	.05 @	.06
Barytes southern off-color	ton	12.00 @	18.00
Western prime white	ton	23.00 @	—
imported	ton	27.00 @	36.00
Basofor	lb.	.04½@	—
Bentonite	lb.	.02 @	.03
Blacks			
Arrow "Aerofloted"	lb.	.03½@	.08½
Bone Black	lb.	.06 @	.12½
Carbon, compressed	lb.	.03 @	.07
Carbon, uncompressed	lb.	.03 @	.07
Disperso, f.o.b. Louisiana	lb.	.03½@	—
Disperso, f.o.b. Texas	lb.	.036 @	—
Drop Black	lb.	.06 @	.14
Fumonex	lb.	.03½@	.07½
Excello, compressed	lb.	.04 @	.08
Gastex, f.o.b. Texas	lb.	.03 @	.06
Lamp Black	lb.	.10 @	.40
Micronex	lb.	.03½@	.08½
Thermatomic-Thermax	lb.		
Flex	lb.		
P-33	lb.		
United carbon, fob Tex.	lb.	.03½@	.08½
Velvetex carbon	lb.	.03 @	.06
Blanc fixe dry f.o.b. works	ton	75.00 @	90.00
Carrara filler	lb.	.01¾@	.02
Catalpo (fact.)	lb.	.02 @	—
Clay, Kaolin, domestic	ton	8.00 @	9.00
Aerfloted, Suprex	ton	8.00 @	20.00
Colloidal	lb.	.05 @	.08
Congaree, c. l. f.o.b. mine	ton	9.00 @	—
Dark Blue Ridge	ton		
Dixie	ton		
Langford	ton		
Lexington	ton	10.00 @	22.00
Mineral Flour, c.l. f.o.b. mine	ton	20.00 @	23.00
Par	ton		
Tensulite		15.00 @	—
Glues, extra white	lb.	.25 @	.26
medium white	lb.	.22 @	.24
Magnesia, carbonate	lb.	.08¾@	.11
Mica, white water grnd.	lb.	.06 @	.08
Off color (biotite)	lb.	.05 @	.07
Rotten Stone (powdered)	lb.	.02 @	.05
Soapstone, powdered	ton	15.00 @	22.00
Starch, powdered	cwt.	— @	2.92
Talc, domestic	ton	12.00 @	15.00
Pyrax A	ton		
Whiting, commercial	cwt.	— @	1.00
English cliffstone	cwt.	1.75 @	2.00
Quaker	ton		
Superfine	ton	10.00 @	12.00
Sussex	ton		
Witco	ton	20.00 @	—
Zinc Carbonate	lb.	.09½@	.10½
Zinc Stearate	lb.	.19 @	.22

MINERAL RUBBER

Genasco (factory)	ton	50.00 @	52.00
Granulated M. R.	ton		
Hard Hydrocarbon	ton		
Paradura	ton	62.50 @	65.00
Parmr, solid	ton	28.00 @	48.00
Pioneer, MR, solid	ton	40.00 @	42.00
Pioneer-granulated	ton	50.00 @	52.00
R & H Hydro-Carbon	ton	27.05 @	29.00
Robertson, MR, solid	ton	34.00 @	80.00
M.R. (gran)	ton	38.00 @	80.00

SOFTENERS

Acids			
Nitric, 36 degrees	cwt.	5.00 @	5.25
Sulfuric, 66 degrees	cwt.	1.60 @	1.95
Tartaric, crystals	lb.	— @	.31½
Acids, Fatty			
Laurex	lb.	.15 @	.16
Stearex	lb.	.13 @	.17
Stearic, double pressed	lb.	.17 @	.22
Alkalies			
Caustic soda, 76%	cwt.	2.90 @	—
Soda ash, 58% C.L.	cwt.	1.17½@	—
Oils			
Corn, refined, bbls.	lb.	.08¾@	.10½
Cottonseed, crude		.06⅞@	.07
Cycline	gal.	.27 @	.34
Degras (c.l. 100 bbls.)	lb.	.03¾@	—
Less c.l. (10-25 bbls.)	lb.	.04 @	—
Lots less than 10 bbls.	lb.	.04¼@	.04½
Fluxrite	lb.	.05½@	.06½
Palm Lagos	lb.	.05 @	.06
Niger	lb.	.04½@	.05¼
Para-Flux	gal.	.17 @	—
Petrolatum, white	lb.	.08 @	.08½
Pigmentaroil	gal.	.18 @	.23
Pine, steam distilled	gal.	.65 @	.70
destructively distilled	gal.	.54 @	.55
Witco Palm Oil	lb.	.11 @	—
Witco Softener (f.o.b. wks.)	lb.	.02 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.06½@	.07½
coal tar	gal.	.05½@	.06
pine, 200 lb. gr. wt.	bbl.	7.00 @	—
Rosin, grade K, 280 lb.	bbl.	— @	6.60
Pigmentar	gal.	.18 @	.23
Tar Retort, 50 gal.	bbl.	13.50 @	15.00
Solvents			
Acetone, pure	lb.	.10 @	.10½
Alcohol, denatured, No. 1 bbls.	gal.	.27 @	.29
Benzol, 90%	gal.	.20 @	.21
Carbon, biculphide	lb.	.05½@	.06¼
Carbon, tetrachloride	lb.	.06¼@	.07
Dryolene (f.o.b. Okla.)	gal.	.10 @	.10½
Gasoline, steel bbls.	gal.	.16 @	—
Naphtha, solvent	gal.	.30 @	.38
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Turpentine, spirits	gal.	.54 @	.56
wood	gal.	.51 @	.61
destructively distilled	gal.	.35 @	—
Waxes			
Beeswax, white	lb.	.34 @	.36
Carnauba	lb.	.26 @	.28
Ceresin, white	lb.	.10 @	.11
Montan, crude	lb.	.06½@	.07
Ozokerite, black	lb.	.24 @	.25
green	lb.	.26 @	.30
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.02½@	—
White crude scale 124/126	lb.	.02½@	—
Refined, 125/127	lb.	.03¾@	—
Refined, 128/130	lb.	.03¾@	—
Refined, 135/137	lb.	.05¼@	—
Refined, 138/140	lb.	.07¼@	—

ANTI-OXIDANTS

AgeRite, Gel	lb.		
Powder	lb.		
Resin	lb.		
White	lb.		
Albasan	lb.	.70 @	.75
Antox	lb.		
B-L-E	lb.	.57 @	.60
Neozone	lb.		
Oxynone	lb.	.68 @	.80
Resistox	lb.	.54 @	.57
Stabilite	lb.	.57 @	.62
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.55 @	.66

SPECIALTIES

Aromatics—Rodo	lb.		
Sunproof	lb.	.35 @	.37½
Sponge Paste	lb.	— @	.30
Tonox	lb.	.56 @	.60

SUBSTITUTES

Black	lb.	.08 @	.14
White	lb.	.10 @	.16
Brown	lb.	.08 @	.15

VULCANIZING INGREDIENTS

Sulfur Chloride (drums)	lb.	.03½@	.04½
Sulfur flour, Ref'n'd, 100% pure (bags)	cwt.	2.40 @	2.75
Commercial (bags	cwt.	1.75 @	2.10
Telloy	lb.		
Vandex	lb.		

TIRES & TUBES
CRUDE RUBBER

STATISTICAL SECTION

AUTOMOBILES
GASOLINE

STATISTICAL developments in the past month have been mixed as regards their significance to the rubber industry. Stocks of the commodity have declined at some points and consumption has been fairly high, but production in the Far East has not shown definite signs of the voluntary restriction that was hoped for. Automobile production was lower in May than in April, and domestic rubber consumption will undoubtedly follow its usual course by declining this month.

While stocks of rubber in the United States were lower at the end of May, the amount of rubber afloat to this country showed a heavy gain. The net result was that the total visible stocks at 294,363 long tons set a new all-time record.

PLAN OF THE SECTION

The statistics included in this section have been chosen for their constant importance to the rubber industry. The tables are reprinted in the same relative position in every issue, each table being kept current by the addition of new figures as soon as they become available.

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British warehouse stocks continued their decline, although the decrease is at least in part due to unusual shipments to Russia. The total for London and Liverpool on June 27 was 136,527 long tons as compared to 139,000 long tons on May 30 and to the peak figure of 140,207 long tons established on May 16.

Gasoline consumption in the first five months of 1931 was not as high as in the same period of 1930. This, together with declining automobile registration, presents one of the most disquieting factors in its possible effect on tire demand.

Latest figures covering imports and exports from the leading producing and consuming countries have been added to the appropriate tables in this section.

U. S. Imports and Exports of Crude Rubber

	Gross Imports			Re-exports			Net Imports
YEARS	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons
1921	185,394	73,772,677	17.76	5,716	2,414,924	18.86	179,678
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,144	185,060,304	26.72	8,772	5,672,319	28.87	300,372
1924	328,056	174,231,331	23.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	22,470,583	56.77	395,667
1927	426,258	339,874,774	35.60	27,775	24,735,488	39.76	398,483
1928	439,731	244,854,973	25.03	32,159	18,128,361	25.17	407,572
1929	860,084	239,178,783	19.15	36,485	16,868,733	20.64	523,599
1930	482,082	139,134,330	12.89	30,205	9,316,205	13.77	451,877
1928:							
July	31,258	14,144,765	20.20	3,087	1,451,446	20.99	28,171
Aug.	31,204	12,860,150	18.39	2,377	1,084,646	20.37	28,827
Sept.	39,835	16,512,019	18.50	3,038	1,384,148	20.34	36,797
Oct.	44,058	18,200,332	18.44	2,405	1,085,407	20.15	41,653
Nov.	36,519	14,878,441	18.19	2,788	1,207,089	18.52	33,731
Dec.	43,511	17,580,966	18.04	2,738	1,165,743	19.00	40,773
1929:							
Jan.	57,564	22,872,943	17.74	3,663	1,773,401	21.61	53,901
Feb.	64,265	24,760,111	17.20	2,955	1,374,783	20.77	61,310
Mar.	50,604	20,380,905	17.98	4,218	2,094,037	22.16	46,386
Apr.	55,725	25,542,726	20.46	3,293	1,624,237	22.02	52,432
May	51,161	24,355,511	21.25	2,386	1,349,690	21.24	48,325
June	41,663	18,799,307	20.14	3,152	1,470,746	20.83	38,511
July	43,944	19,342,147	19.65	3,424	1,590,411	20.73	40,520
Aug.	37,222	16,530,090	19.83	2,644	1,232,217	20.80	34,578
Sept.	34,472	15,214,485	19.70	2,011	861,068	19.11	32,461
Oct.	38,163	16,192,261	18.94	2,614	1,190,510	20.33	35,549
Nov.	43,507	18,189,305	18.66	2,929	1,300,354	19.82	40,578
Dec.	42,952	17,573,330	18.27	2,745	1,007,279	16.38	40,207
1930:							
Jan.	47,496	17,793,563	16.72	3,144	1,077,415	15.30	44,352
Feb.	42,687	14,798,240	15.48	2,280	960,790	18.80	40,407
Mar.	44,976	14,653,243	14.54	3,187	1,192,708	16.71	41,789
Apr.	45,428	14,783,605	14.53	2,688	892,532	14.82	42,735
May	42,692	13,373,232	13.98	3,154	1,085,482	15.37	39,538
June	39,993	12,215,848	13.79	3,174	1,028,653	14.47	36,819
July	35,182	10,553,944	13.39	2,807	759,260	12.08	32,375
Aug.	35,713	9,666,362	12.08	2,357	655,773	12.42	33,356
Sept.	35,380	8,460,812	10.68	1,514	430,772	12.70	33,866
Oct.	46,069	9,893,980	9.59	2,432	419,325	7.70	43,637
Nov.	29,401	5,700,086	8.66	1,300	271,348	9.32	28,101
Dec.	37,800	7,175,242	8.59	2,168	542,197	11.17	35,132
1931:							
Jan.	36,307	7,190,591	8.84	1,706	350,480	9.17	34,601
Feb.	34,005	6,564,969	8.62	1,799	357,078	8.86	32,206
Mar.	40,393	7,356,505	8.13	2,800	534,180	8.52	37,593
Apr.	44,536	7,712,941	7.73	2,607	528,947	9.06	41,929
May	35,526	5,886,638	7.40	2,501	418,301	7.47	33,025
June							

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

Figures on Monthly Basis

	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	29,058	29,638	32,196	31,518	34,403	43,002	36,194	28,557
Feb.	25,736	29,761	31,136	30,137	33,702	41,594	32,302	28,797
Mar.	28,385	33,498	32,936	36,141	35,688	44,730	35,450	32,788
Apr.	27,129	34,139	32,696	35,871	32,772	47,521	39,686	33,321
May	25,845	35,322	29,364	34,592	37,333	49,233	39,386	37,817
June	22,753	35,822	28,598	33,801	37,676	43,227	34,195	.....
July	23,396	36,053	27,577	29,219	37,407	41,526	29,508	.....
Aug.	28,982	35,909	34,533	33,460	42,927	38,274	30,850	.....
Sept.	31,497	31,691	32,904	27,214	39,882	34,707	25,515	.....
Oct.	31,520	29,047	29,836	26,790	40,857	34,800	27,516	.....
Nov.	27,289	28,253	28,080	26,792	37,461	27,659	23,691	.....
Dec.	27,199	28,748	26,293	25,492	31,232	23,531	21,687	.....
Totals	328,769	388,481	366,149	371,027	441,340	469,804	375,980	.....

Figures on Quarterly Basis

Quarter	1924	1925	1926	1927	1928	1929	1930	1931
Jan./Mar.	87,609	95,263	94,301	99,216	103,558	128,565	101,610	89,652
Apr./June	75,674	104,099	87,109	103,242	103,500	139,292	112,229	
July/Sept.	83,813	99,493	93,793	89,210	117,573	113,746	85,261	
Oct./Dec.	92,656	85,789	83,212	80,860	117,597	84,872	72,020	
Totals	339,752	384,644	358,415	372,528	442,227	466,475	371,120	

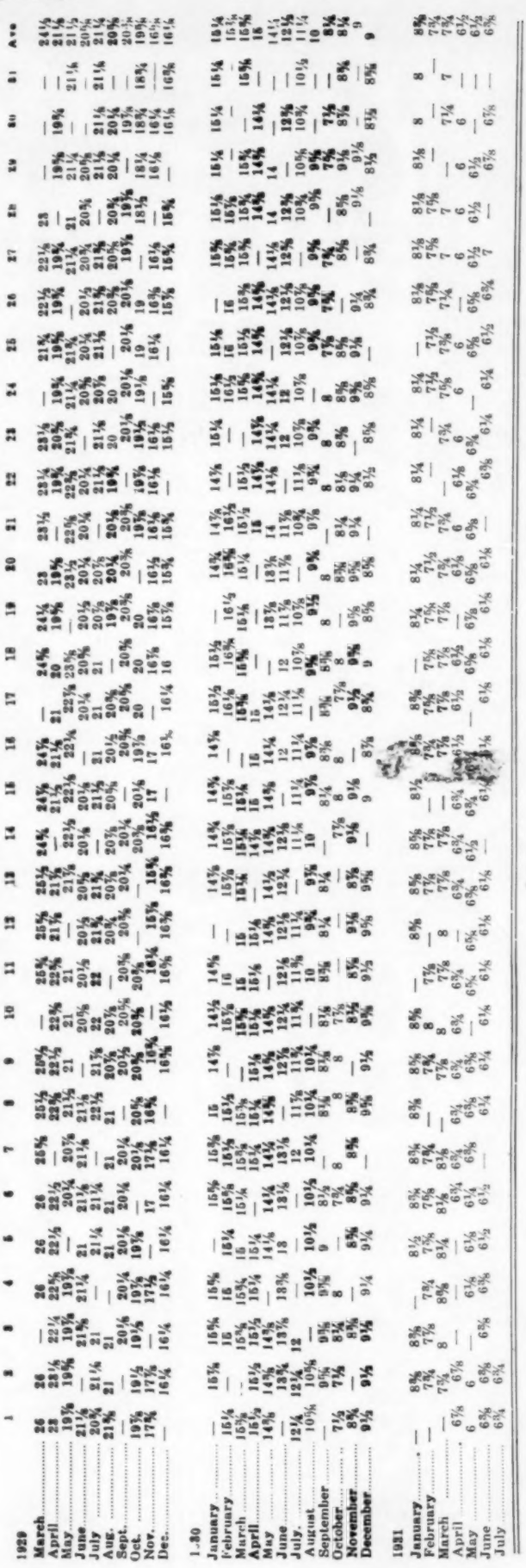
Note—The Rubber Association estimates its monthly rubber consumption figures to be 90 per cent complete. Up until 1925 the quarterly figures were likewise estimated to be 90 per cent complete; beginning with 1925 an estimate of 92 per cent completeness has been used. These estimates have been used in raising the figures in this table to 100 per cent. The quarterly figures are generally regarded as the most authentic; the monthly figures may be accepted as preliminary.

U. S. Consumption of Gasoline

(In Barrels of 42 Gallons)

MONTHS	1930	1931	MONTHS	1930	1931
January	25,731,000	26,844,000	July	38,256,000	
February	26,509,000	26,133,000	August	37,433,000	
March	31,029,000	31,037,000	September	37,823,000	
April	34,549,000	33,400,000	October	32,267,000	
May	36,497,000	35,716,000	November	30,984,000	
June	35,902,000		December	29,094,000	

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*



Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1921

Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15
1911	141.30	1915	65.85	1919	48.70
1912	121.60	1916	72.50	1920	36.30
1913	82.04	1917	72.23	1921	16.36

Average Monthly Price per Pound Since 1922

Month	1922 Cents	1923 Cents	1924 Cents	1925 Cents	1926 Cents	1927 Cents	1928 Cents	1929 Cents	1930 Cents	1931 Cents
Jan.	18.82	32.73	25.86	36.71	79.50	38.75	40.25	20.14	15.24	8.34
Feb.	16.12	35.14	25.29	36.01	62.25	38.25	32.75	23.97	15.85	7.70
Mar.	14.53	34.21	22.83	41.00	59.00	41.04	26.82	24.55	15.34	7.71
Apr.	15.99	32.48	22.51	43.64	51.25	40.86	18.97	21.18	14.93	6.43
May	15.25	27.39	18.89	58.47	47.75	40.76	18.99	21.46	14.24	6.49
June	15.11	26.88	18.81	77.26	42.50	37.25	19.59	20.64	12.45	6.35
July	14.67	26.10	22.16	103.16	41.03	34.87	19.40	21.30	11.24	
Aug.	13.93	28.84	26.17	82.99	38.50	35.12	19.46	20.59	9.96	
Sept.	14.44	28.95	27.56	88.88	41.00	33.67	18.47	20.37	8.28	
Oct.	19.78	26.93	31.13	98.01	42.50	34.32	18.83	19.67	8.20	
Nov.	23.88	27.14	34.33	104.80	38.50	37.58	18.26	16.62	9.01	
Dec.	27.42	26.60	37.88	98.51	38.25	40.63	17.97	16.12	9.05	
Average for Year	17.50	29.45	26.20	72.46	48.50	37.72	22.48	20.55	11.98	

London Closing Prices of Ribbed Smoked Sheet

(In Pence Per Pound)

Day	Apr.	May	June	July	Day	Apr.	May	June	July
1	3¼	2⅞	3	3¼	17	3⅛	—	3	—
2	3⅜	2⅞	3	3¼	18	3⅛	3⅛	3	—
3	—	—	3	—	19	—	3⅛	3	—
4	—	2⅞	3	—	20	3	3⅛	3⅛	—
5	—	2⅞	3⅛	—	21	2⅞	3⅛	—	—
6	—	2⅞	3⅛	—	22	2⅞	3⅛	3⅛	—
7	3⅛	3	—	—	23	2⅞	3⅛	3⅛	—
8	3⅛	3	3	—	24	2⅞	—	3⅛	—
9	3⅛	3	3	—	25	—	—	3⅛	—
10	3⅛	—	3	—	26	—	3	3⅛	—
11	3⅛	3	3	—	27	2⅞	3	3⅜	—
12	—	3	3	—	28	2⅞	3⅛	—	—
13	3⅛	3	3	—	29	2⅞	3⅛	3⅛	—
14	3⅛	3	—	—	30	2¾	3⅛	3⅛	—
15	3⅛	3⅛	3	—	31	—	—	—	—
16	3⅛	3⅛	3	—					

Average Monthly Price Per Pound

Month	1929 Pence	1930 Pence	1931 Pence	Month	1929 Pence	1930 Pence	1931 Pence
Jan.	9.942	7.471	4.160	Aug.	10.505	4.880	
Feb.	11.875	7.948	3.823	Sept.	10.160	4.075	
Mar.	12.135	7.595	3.822	Oct.	9.620	4.023	
Apr.	10.490	7.391	3.082	Nov.	8.442	4.440	
May	10.717	6.926	3.035	Dec.	7.958	4.516	
June	10.580	6.195	3.082	Average for Year	10.291	5.926	
July	11.065	5.648					

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Day of Month	June	July	Day of Month	June	July	Day of Month	June	July
1	8.55	10.15	11	8.65	——	21	——	——
2	8.35	10.00	12	8.70	——	22	9.75	——
3	8.60	——	13	8.65	——	23	9.70	——
4	8.80	——	14	——	——	24	9.80	——
5	8.60	——	15	8.65	——	25	9.90	——
6	8.85	——	16	8.95	——	26	10.35	——
7	——	——	17	8.90	——	27	10.40	——
8	8.45	——	18	8.60	——	28	——	——
9	8.25	——	19	8.85	——	29	10.05	——
10	8.45	——	20	9.05	——	30	9.85	——
						31	——	——

Average Monthly Price Per Pound

Month	1929 Cents	1930 Cents	1931 Cents	Month	1929 Cents	1930 Cents	1931 Cents
Jan.	20.22	17.21	10.27	Aug.	18.62	12.03	
Feb.	20.21	15.62	10.96	Sept.	18.83	10.85	
Mar.	20.19	15.13	10.90	Oct.	18.46	10.62	
Apr.	20.29	16.39	10.19	Nov.	17.53	10.96	
May	19.41	16.43	9.38	Dec.	17.28	10.02	
June	18.74	14.48	9.05	Average for Year	19.03	13.57	
July	18.62	13.10					

World Stocks of Crude Rubber

ON HAND OR AFLOAT TO THE U. S.

At End of	ON HAND			AFLOAT			ON HAND AND AFLOAT		
	1929	1930	1931	1929	1930	1931	1929	1930	1931
Jan.	76,342	131,744	209,487	93,330	61,863	56,187	169,672	193,607	265,674
Feb.	90,058	143,863	212,833	75,790	63,404	63,680	165,848	207,267	276,513
Mar.	100,536	141,843	217,804	67,065	63,646	63,133	167,601	205,489	280,937
Apr.	107,659	148,272	228,382	65,798	63,261	56,700	173,457	211,533	285,082
May	97,192	146,179	220,799	65,793	68,168	73,564	162,985	214,347	294,363
June	92,061	151,551	.....	54,668	58,657	.....	146,729	210,209	.....
July	92,535	152,001	.....	46,145	58,326	.....	138,680	210,327	.....
Aug.	90,769	158,604	.....	49,423	61,168	.....	140,192	219,772	.....
Sept.	84,362	169,927	.....	58,758	60,923	.....	143,120	230,851	.....
Oct.	88,483	185,470	.....	59,180	51,122	.....	147,663	236,593	.....
Nov.	92,219	189,925	.....	62,358	52,538	.....	154,577	242,463	.....
Dec.	118,609	200,998	.....	62,388	56,035	.....	180,997	257,033	.....

(Rubber Manufacturers' Association figures raised to 100%)

STOCKS IN GREAT BRITAIN

Stocks in London

(No. of Tons in Wharves and Warehouses, including Latex)

At end of	1929	1930	1931	At end of	1929	1930	1931
Jan.	25,191	60,434	81,093	July	30,080	81,048	
Feb.	25,554	64,557	82,265	Aug.	35,605	80,931	
Mar.	28,214	68,923	84,736	Sept.	42,188	83,329	
Apr.	31,368	74,676	86,982	Oct.	47,803	77,647	
May	31,290	77,312		Nov.	52,454	76,887	
June	31,025	80,260		Dec.	54,304	78,013	

At End of Recent Weeks

	First Saturday	Second Saturday	Third Saturday	Fourth Saturday	Fifth Saturday
1931					
February	81,183	81,432	82,111	82,185	
March	83,451	83,001	83,132	83,862	
April	84,339	84,421	85,704	85,922	
May	86,512	86,663	86,037	85,739	85,332
June	84,915	83,743	82,919	82,441	

Stocks in Liverpool

1931					
February	43,293	43,679	44,555	44,776	
March	45,487	47,105	48,333	48,321	
April	49,502	49,733	51,221	52,043	
May	51,926	52,865	54,170	53,842	53,668
June	54,258	54,812	54,422	54,086	

STOCKS IN PENANG AND SINGAPORE

(Stocks held by Dealers—Quantities in Long Tons)

End of	1929	1930	1931	End of	1929	1930	1931
Jan.	29,617	39,727	49,802	July	33,559	45,459	
Feb.	32,373	44,371	49,283	Aug.	30,834	48,132	
Mar.	29,437	45,657	49,590	Sept.	32,138	44,015	
Apr.	26,474	48,473	45,868	Oct.	33,770	39,930	
May	30,764	44,715	44,278	Nov.	30,963	41,674	
June	30,403	42,451		Dec.	35,548	45,963	

STOCKS IN OTHER CENTRES

1930 End of	Malaya Mainland	Afloat for Europe	Holland	Colombo	Para and Manaos
June	36,578	20,920	2,816	5,856	4,588
July	38,311	27,290	2,312	4,500	4,665
Aug.	39,482	30,310	2,196	5,200	4,489
Sept.	39,863	31,000	2,343	5,834	4,854
Oct.	38,587	27,630	2,378	5,600	5,156
Nov.	40,551	24,220	2,405	5,400	4,535
Dec.	40,919	25,980	2,569	5,189	5,132
1931:					
Jan.	41,620	24,500	3,168		5,124
Feb.	43,027	24,580	3,326		5,404
Mar.	40,227	25,800	3,622	3,857	4,843
Apr.	37,103	18,500	3,659		5,137
May	37,171	20,000			4,896

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total	Per Cent Balloons		Total	Per Cent Balloons
1923	23,140,620	0.6	1927	19,700,003	79.1
1924	21,863,311	19.7	1928	24,247,282	81.6
1925	26,001,664	66.8	1929	24,141,502	80.3
1926	24,199,524	78.8	1930	17,364,096	80.1
1930			1931		
July	1,449,161	80.7	January	681,301	67.9
August	1,504,187	78.1	February	1,010,774	73.9
September	1,052,109	80.2	March	1,425,336	81.4
October	863,579	73.3	April	1,717,652	79.9
November	920,435	72.2	May	1,508,349	83.7
December	567,355	69.1	June		

U. S. Tire and Tube Statistics

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1923	1924	1925	1926	1927	1928	1929	1930
Production	45,259	51,633	60,845	61,237	64,439	77,944	68,726	50,96
Shipments	45,204	50,120	59,262	59,002	64,059	74,296	69,395	53,63
Inventory[2]	5,772	7,427	8,142	10,456	10,264	13,624	11,838	9,00

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1929	1930	1931	1929	1930	1931	1929	1930	1931
Jan.	6,301	4,485	3,675	6,211	4,406	3,744	12,855	11,924	8,957
Feb.	6,479	4,555	3,985	4,951	4,195	3,402	14,525	11,410	9,536
Mar.	7,049	4,863	4,663	6,289	4,717	4,122	15,329	12,513	10,014
Apr.	7,391	5,648	4,944	6,838	5,089	4,932	15,870	13,076	10,031
May	7,636	3,717		6,735	5,216		16,733	13,432	
June	6,847	5,122		6,800	5,294		16,497	13,277	
July	6,320	3,991		7,364	5,447		15,034	11,812	
Aug.	5,693	4,166		7,354	5,175		13,337	10,848	
Sept.	4,460	3,365		5,623	4,405		12,070	9,812	
Oct.	4,611	3,582		4,649	3,499		12,042	9,803	
Nov.	3,378	2,654		3,355	2,834		12,127	9,595	
Dec.	3,057	2,814		3,237	3,361		11,838	9,003	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1923	1924	1925	1926	1927	1928	1929	1930
Production	60,116	70,706	82,614	76,618	70,823	80,180	68,829	52,420
Shipments	59,072	68,106	81,004	71,591	72,896	77,127	70,592	54,938
Inventory[2]	8,425	11,052	11,313	16,200	13,692	16,117	12,807	9,999

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1929	1930	1931	1929	1930	1931	1929	1930	1931
Jan.	6,109	4,607	3,623	6,789	4,857	4,062	14,424	12,704	9,439
Feb.	6,346	4,634	3,916	4,948	4,337	3,400	15,936	13,036	9,921
Mar.	7,000	4,941	4,450	6,317	4,727	3,789	16,641	13,179	10,475
Apr.	7,157	5,510	4,617	6,716	4,848	4,636	17,000	13,784	10,413
May	7,181	5,535		6,598	5,074		17,745	13,852	
June	6,542	4,950		6,515	5,265		17,294	13,612	
July	5,793	3,939		7,605	5,855		15,311	11,657	
Aug.	5,481	4,796		7,672	5,762		13,072	10,737	
Sept.	5,190	3,817		5,859	4,541		12,585	10,065	
Oct.	5,000	3,951		4,689	3,472		12,802	10,517	
Nov.	3,544	2,680		3,480	2,788		12,845	10,313	
Dec.	3,484	3,060		3,404	3,412		12,807	9,999	

(1) Rubber Manufacturers' Association figures, raised to 100%. The Association estimates its figures to be 75% complete up until 1929 and 80% complete beginning with 1929, and that basis has been accepted when preparing the statistics in this table.

(2) Held by manufacturers at end of period indicated.

Automobile Production

	United States			Canada			Grand Total
	Total	Passenger Cars	Trucks	Total	Passenger Cars	Trucks	
1924	3,600,918	3,203,049	397,869	135,246	117,765	17,481	3,736,164
1925	4,265,704	3,760,459	505,245	161,389	139,311	22,078	4,427,093
1926	4,298,799	3,808,753	490,046	205,002	164,483	40,609	4,503,891
1927	3,393,887	2,938,868	453,019	179,426	146,850	32,556	3,573,313
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929							
July	500,331	427,213	73,118	17,461	13,600	3,861	517,792
Aug.	499,629	444,711	54,918	14,214	11,037	3,177	513,843
Sept.	415,332	365,651	49,681	13,817	10,710	3,107	429,149
Oct.	380,011	321,195	58,816	14,523	8,975	5,548	394,534
Nov.	217,570	170,928	46,642	9,424	7,187	2,287	226,994
Dec.	119,950	92,717	27,233	5,495	4,426	1,069	125,445
TOTAL	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930							
Jan.	273,089	235,099	37,990	10,388	8,856	1,532	283,477
Feb.	346,940	297,483	49,457	15,548	13,021	2,527	362,488
March	401,378	336,178	64,200	20,730	17,165	3,565	422,108
April	442,630	375,171	67,459	24,257	20,872	3,385	466,887
May	417,154	362,784	54,370	24,672	21,251	3,421	441,826
June	335,475	289,704	45,771	15,090	12,194	2,896	350,565
July	262,363	222,700	39,663	10,188	8,556	1,632	272,551
Aug.	224,368	187,288	35,758	9,792	6,946	2,846	234,160
Sept.	216,877	175,720	41,157	7,957	5,623	2,334	224,834
Oct.	150,044	112,800	37,244	4,541	3,206	1,335	154,585
Nov.	135,752	102,957	32,795	5,407	3,527	1,880	141,159
Dec.	155,701	124,173	31,528	5,622	4,225	1,397	161,323
Total	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931							
Jan.	171,848	138,317	33,531	6,496	4,552	1,944	178,344
Feb.	219,940	180,419	39,521	9,871	7,529	2,342	229,811
Mar.	276,405	231,244	45,161	12,993	10,483	2,510	289,398
Apr.	335,708	285,693	50,015	17,159	14,043	3,116	352,869
May	315,115	269,420	45,695	12,738	10,621	2,117	327,853
June							

Exports of Crude Rubber from Principal Producing Countries

(*Long Tons*)

	BRITISH MALAYA[1]							DUTCH EAST INDIES[4]							
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon[2]	India & Burma[3]	Sarawak[4]	British North Borneo[5]	Siam[4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China[3]	Amazon Valley	All Other[4]	World Total[7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,955
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	517,528
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,550
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	25,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1929:															
May	43,960	15,593	28,367	5,723	800	966	548	453	6,264	6,961	13,437	1,059	1,922	733	67,233
June	40,398	14,344	26,054	5,563	1,122	1,061	547	422	5,582	6,693	11,270	757	1,398	548	61,017
July	46,454	15,071	31,383	5,457	974	1,247	641	462	6,422	7,192	13,995	575	1,457	543	70,348
Aug.	50,441	15,469	34,972	6,079	685	993	641	431	4,644	7,298	10,782	1,032	1,563	499	69,619
Sept.	53,484	12,392	41,092	7,993	884	832	640	406	4,708	7,517	10,149	655	1,566	504	76,446
Oct.	47,937	12,516	35,421	8,381	812	1,047	671	485	4,697	8,295	10,512	893	1,606	445	73,265
Nov.	46,279	11,204	35,075	6,660	1,065	668	672	278	4,760	6,711	9,380	771	1,442	535	68,017
Dec.	46,147	15,018	31,129	8,683	900	930	672	320	5,189	8,279	11,102	966	1,674	443	70,287
1930:															
Jan.	52,535	11,773	40,762	7,741	1,560	791	642	386	5,709	7,831	8,928	856	1,837	585	77,628
Feb.	48,947	12,960	35,987	8,055	1,245	847	642	469	6,900	7,191	11,414	944	1,787	480	75,961
Mar.	47,320	12,236	34,084	6,617	1,129	976	642	391	5,796	6,612	11,214	643	1,674	536	70,314
Apr.	43,803	14,627	29,176	4,444	856	1,026	502	366	4,802	6,326	12,724	433	1,201	630	62,486
May	49,016	13,253	35,763	5,968	975	917	502	350	6,352	6,661	12,041	753	1,383	555	72,220
June	36,607	12,120	24,487	4,577	778	1,040	201	392	4,728	4,776	9,512	425	974	551	52,441
July	41,347	12,759	28,588	3,868	792	1,087	600	327	6,022	5,891	9,770	648	810	418	58,821
Aug.	47,802	10,304	37,498	7,077	600	740	600	335	5,892	7,197	9,520	394	809	382	71,134
Sept.	48,529	8,087	40,442	7,966	343	680	600	289	5,960	6,358	7,302	527	1,093	474	72,034
Oct.	47,770	7,312	40,458	7,681	591	598	650	300	5,916	6,956	6,352	667	669	449	71,287
Nov.	41,281	7,774	33,507	6,042	864	631	600*	311	5,334	6,401	8,001	654	658	238	63,241
Dec.	42,086	9,671	32,415	6,084	1,049	976	600*	335	6,254	7,196	8,476	721	1,365	353	66,674
1931:															
Jan.	41,579	11,029	30,550	6,751	1,315	770	670	424	5,923	7,348	10,328	914	994	350*	66,337
Feb.	41,951	9,672	32,279	6,345	1,041	945	600*	409	4,869	7,206	9,001	1,018	1,271	350*	65,334
Mar.	48,589	12,009	36,580	6,217	1,209	930	600*	536	5,434	7,104	11,258	992	1,338	350*	72,548
Apr.	43,453	9,977	33,476	3,487	641	788	600*	340	6,473	6,063	8,759	610	629	350*	62,216
May	44,281	10,479	33,802	4,534		869	600*	413	7,372	6,797	10,955	702	1,110	350*	

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927, 1,437 in 1928, and 2,670 in 1929. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons 1924, 6 tons 1925, 20 tons 1926, about ½ ton in 1927, and 1 ton in 1928. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons 1924, 2,239 tons 1925, 44 tons in 1926, 84 tons in 1927, 1,459 tons in 1928, and 1,302 tons in 1929. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands. This figure includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. *Figure is provisional; final figure will be shown immediately it becomes available.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

	United States[1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,399
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,012
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,808
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,483	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,015
1929:															
May	48,475	5,112	3,152	3,682	2,937	2,314	1,417	996	1,437	854	201	468	37	277	71,359
June	38,821	4,787	6,814	3,948	3,075	1,593	1,624	695	2,215	672	687	507	24	520	65,882
July	41,114	4,993	4,839	3,559	3,205	2,388	2,023	1,056	2,918	1,039	253	519	30	465	68,401
Aug.	35,397	14,594	4,645	4,082	2,879	3,663	908	1,234	724	902	254	429	25	319	70,055
Sept.	32,912	17,010	3,889	4,691	1,908	3,511	1,224	1,235	853	672	253	361	91	477	68,453
Oct.	36,040	16,111	4,489	3,355	1,821	3,902	1,838	1,073	1,125	1,147	278	710	91	201	72,181
Nov.	41,097	13,141	3,082	3,776	2,709	3,221	1,275	1,226	1,453	361	253	595	62	313	72,564
Dec.	40,588	12,434	4,274	2,921	2,114	2,251	1,198	1,200	726	741	52	677	90	443	69,709
1930:															
Jan.	44,911	11,106	4,207	3,862	2,842	2,805	910	826	332	612	209	552	200*	577	73,949
Feb.	40,792	10,293	4,482	3,697	2,250	1,886	1,385	2,705	457	1,143	188	315	200*	239	69,533
Mar.	42,216	12,346	4,354	4,289	3,776	2,663	1,083	1,153	975	678	358	322	200*	263	74,676
Apr.	43,036	13,058	5,006	4,488	2,303	2,769	2,067	929	673	1,431	158	461	200*	255	76,790
May	40,012	9,861	5,233	4,879	2,593	2,699	1,279	1,645	64	1,250	230	274	200*	282	65,620
June	37,374	9,645	4,458	3,794	2,579	2,677	1,378	1,574	67	691	343	507	200*	282	65,620
July	32,785	7,650	3,311	3,449	3,347	1,206	587	567	84	939	172	756	200*	342	55,395
Aug.	34,518	8,369	3,953	3,515	2,108	2,170	886	149	265	888	37	747	200*	450	58,250
Sept.	34,373	16,015	5,285	4,089	1,578	2,606	1,279	1,373	414	824	221	817	200*	411	69,481
Oct.	44,385	9,095	7,403	3,747	1,942	3,951	2,460	2,782	609	769	439	1,132	200*	351	79,261
Nov.	28,437	—250	13,662	3,074	2,128	4,003	2,510	2,140	464	596	364	1,180	200*	343	58,851
Dec.	35,202	12,249	7,149	3,105	1,347	4,104	2,815	544	950	814	205	647	200*	673	70,004
1931:															
Jan.	34,892	9,730	5,954	3,847	1,709	2,861	1,036	1,775	601	986	348	464	240	635	65,015
Feb.	32,575	12,226	4,510	3,374	1,927	3,264	1,393	1,022	495	785	157	475	201	366	62,770
Mar.	37,988	12,335	4,386	3,545	3,012	2,323	418	2,372	435	862	346	400	392	507	69,321
Apr.	43,036	9,440	4,346	3,054	2,070	3,478	528	1,450		515	333	495	208	324	
May	33,343	7,212	2,880										181		

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]United States imports of guayule are included in this compilation. *Figure is provisional; final figure will be shown immediately it becomes available.

Domestic Production of Miscellaneous Rubber Goods

	Rubber Proofed Fabrics	Rubber Heels	Rubber Soles	Mechanical Goods Shipments
	Yards	Pairs	Pairs	Dollars
1924	25,020,000	186,279,000	(1)	$48,615,000
1925	23,988,000	206,970,000	16,211,620(2)	64,877,000
1926	29,328,000	183,312,000	12,253,000	76,789,000
1927	37,872,000	201,014,000	27,160,000	68,625,000
1928	41,179,000	235,170,000	37,645,000	69,114,000
1929	50,731,000	252,126,000	34,499,000	74,770,000
1930	42,681,000	178,059,000	29,514,000	58,465,000
1930:				
April	4,029,000	17,762,000	2,593,000	5,989,000
May	3,597,000	15,603,000	1,939,000	6,163,000
June	3,379,000	15,795,000	2,734,000	5,318,000
July	2,940,000	15,117,000	2,663,000	4,910,000
August	3,458,000	13,735,000	1,473,000	4,552,000
September	5,046,000	14,322,000	2,193,000	4,083,000
October	5,209,000	16,460,000	3,056,000	4,186,000
November	2,822,000	11,083,000	1,426,000	3,400,000
December	1,909,000	13,101,000	3,021,000	3,388,000
1931:				
January	2,206,000	12,973,000	2,481,000	3,599,000
February	2,184,000	13,156,000	2,724,000	3,711,000
March	2,769,000	14,661,000	2,292,000	4,412,000

(1) Not available; (2) Last 9 months only.
Source: "Survey of Current of Business of the Department of Commerce."

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All quantities in Long Tons)

	Guayule		Balata		Jelutong		Liquid Latex (1)	
	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars
1919	1,430	760,690	727	937,038	8,232	2,213,964	—	—
1920	758	345,985	1,064	1,260,043	5,672	2,068,501	—	—
1921	58	26,945	814	1,077,859	1,745	351,893	—	—
1922	127	57,040	812	978,765	2,335	403,812	—	—
1923	1,155	542,227	700	898,524	4,565	853,308	—	—
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,853	3,537,810
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,388	4,680,386
1927	5,018	2,674,957	582	447,246	7,785	2,448,657	1,116	876,077
1928	3,075	1,755,685	731	430,855	7,552	2,540,059	4,167	2,185,579
1929	1,231	545,175	728	566,964	8,203	2,458,136	3,728	1,787,997
1930	1,096	347,388	501	422,684	5,907	1,403,244	4,449	1,506,804
1930:								
June	168	51,561	52	47,000	532	120,424	389	129,368
July	93	26,000	24	17,463	45	102,325	242	78,688
Aug.	50	14,000	11	5,600	766	168,511	944	253,127
Sept.	100	28,000	45	39,512	486	86,664	402	127,751
Oct.	64	18,527	36	30,702	490	113,638	306	99,637
Nov.	—	—	73	61,650	389	84,219	332	65,265
Dec.	—	—	90	66,198	429	116,644	70	20,481
1931:								
Jan.	—	—	46	31,870	355	58,897	291	70,708
Feb.	—	—	17	13,801	511	114,100	369	89,470
Mar.	—	—	66	23,568	625	127,803	395	75,285
Apr.	—	—	219	69,284	676	140,309	372	73,867
May	—	—	120	44,025	205	36,086	318	82,202

(1) Latex import figures not available before 1924.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

		Consumption					Consumption			
Year	Production	Tons	% to Crude	Stocks*	Year	Production	Tons	% to Crude	Stocks*
1921	36,725	41,351	24.1	.....	1926	180,582	164,500	45.9	23,218
1922	57,334	54,458	19.3	.....	1927	189,144	178,471	47.6	24,980
1923	74,766	69,534	22.7	.....	1928	208,516	223,000	50.4	24,785
1924	80,079	76,072	22.4	.....	1929	218,954	226,588	48.4	27,464
1925	132,930	137,105	35.6	13,203	1930	146,808	155,673	39.6	24,008
1929:									
Jan.	18,685	21,068	49.1	24,394	July	18,387	20,236	48.7	19,679
Feb.	18,094	19,829	47.7	23,305	Aug.	19,787	18,230	47.6	22,309
Mar.	19,984	20,867	46.7	22,076	Sept.	18,660	17,071	49.2	24,984
Apr.	19,899	22,435	47.8	20,680	Oct.	18,865	18,744	53.8	25,117
May	20,385	23,176	47.1	19,479	Nov.	14,363	15,330	55.4	26,080
June	18,416	18,141	42.0	17,980	Dec.	13,429	11,531	49.0	27,464
1930:									
Jan.	15,010	17,454	47.6	24,241	July	12,322	12,384	42.3	23,573
Feb.	15,846	14,559	44.5	24,243	Aug.	12,047	10,985	35.9	22,980
Mar.	17,400	15,241	42.2	24,415	Sept.	11,433	10,480	41.4	21,996
Apr.	17,828	16,904	42.0	24,587	Oct.	12,349	10,724	39.3	21,145
May	17,812	17,052	42.7	23,356	Nov.	10,763	8,816	37.5	24,007
June	15,714	14,063	40.8	24,449	Dec.	10,073	8,449	39.3	24,008
1931:									
Jan.	10,349	10,728	37.6	22,420	July	.....	.....	.....	.....
Feb.	10,871	10,800	37.5	18,876	Aug.	.....	.....	.....	.....
Mar.	12,938	12,524	38.3	18,375	Sept.	.....	.....	.....	.....
Apr.	13,267	11,745	35.0	18,356	Oct.	.....	.....	.....	.....
May	13,478	13,103	34.6	18,088	Nov.	.....	.....	.....	.....
June	.....	.....	.....	.....	Dec.	.....	.....	.....	.....

*Stocks on hand at the end of month or year. Exports of reclaimed rubber, not shown in this table, amounted to 8,540 tons in 1927, 9,577 tons in 1928, and 12,369 tons in 1929.
(Rubber Manufacturers' Association figures raised to 100%)

REVIEW DESK

Books, New Publications, Catalogues, Etc.

HANDBUCH DER KAUTSCHUK- UND ASBEST-INDUSTRIE. Edited by Walter Lindemann. Published by Atlas-Verlag Dr. Alterthum & Co., Kurfurstendamm 30, Berlin W 15, Germany. 1931. 320 pp. RM 15.

A review of the German rubber and asbestos industries is followed by an 88-page list of German manufacturers with useful data on each one. The volume also contains tariff information, a list of trade names, sources of supply for raw materials and equipment, and 15 pages of reproductions of actual trade marks.

MODERN PROGRESS IN RUBBER COMPOUNDING. By Charles R. Boggs. Published by the Simplex Wire & Cable Company, 201 Devonshire Street, Boston, Mass. 1931. 28 pp. For free distribution.

After some brief comments on rubber itself, its physical structure and behavior, and the mechanism of vulcanization, the author discusses the salient developments in rubber compounding, with particular reference to insulation. Some of the advances brought about by the use of accelerators, antioxidants, new vulcanizing materials, new compounding materials, etc., are discussed and experimental data which demonstrates the improved physical, electrical and aging characteristics are given. Accelerated aging tests are treated in some detail, with an appendix presenting various opinions as to their value. This is a reprint of a paper given by the author before the Signal Section of the American Railway Association on May 13.

CYCLES IN THE AUTOMOBILE PNEUMATIC TIRE RENEWAL MARKET IN THE UNITED STATES. By Royal E. Davis. 1931. 10 pp.

As statistician of the Goodyear Tire & Rubber Company, Mr. Davis has made extensive researches into the available figures on tire marketing in this country. This paper presents the statistical technique and the interpretation of an index he has constructed of renewal pneumatic tire sales activity between 1921 and 1930. He concludes that tire activity has moved two to six months ahead of general business in the past, both on the down swing and the up swing. "Viewing 1931," he comments, "on the whole I expect renewal tire sales activity to improve steadily throughout the year. While this improvement is not likely to be so swift as the recovery following depression periods in the past, it seems reasonable that 1931 should be a more active year than 1930, but less active than 1929." The paper is reprinted from the March supplement of the *American Statistical Journal.*

LUBRICATION OF ROYLE TUBERS, STRAINERS AND INSULATING MACHANES. Published by John Royle & Sons, Paterson, N. J. 1931. 8 pp. For free distribution.

The lubrication methods adopted for Royle rubber machinery is the result of many years of experience. These practices are described in this bulletin, together with several valuable operating notes on lubrication.

A SAVING AT EVERY TURN. Published by the Link-Belt Company, 910 South Michigan Avenue, Chicago, Ill. 1931. 16 pp. For free distribution.

The complete line of positive drives offered by this company is described in this booklet, together with illustrations of installations of these units. There are accompanying descriptions which tell of the broad scope of the company's equipment.

CHARTS: MONTHS OR YEARS? Published by the Brooke Engineering Company, Inc., 3640 North Lawrence Street, Philadelphia, Pa. 1931. 12 pp. For free distribution.

By actual charts illustrating operations in eight plants in which the company's pressure regulators were installed, this bulletin shows the value of this type of equipment.

INDUSTRIAL ACCIDENT STATISTICS. Published by the National Safety Council, Inc., 20 North Wacker Drive, Chicago, Ill. 1931. 40 pp.

The rubber industry should find considerable satisfaction in the fact that it ranks sixth in a list of 28 domestic industries in frequency of injuries to workers and fifth in point of severity of accidents. In 52 establishments, whose employes last year worked 179,000,000 man hours, the frequency rate was only 12.48 and the severity rate .83, as compared with rates of 18.47 and 1.97 for all industry. Charts and tables for all industries for 1930 are included in this annual report.